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DOMINION RESEARCH FOUNDATION
CALCUTTA

PRONUNCIATION

The pronunciation of titles is indicated by accenting the word or by respelling it phonetically in italics. In the phonetic spelling, letters are used to indicate the sounds which they most commonly represent.

A vowel is *short* when followed by a consonant in the same syllable, unless the syllable ends in silent *e*.

A vowel is *long* when standing alone or in a syllable which ends in silent *e* or when ending an accented syllable.

S is always soft, and never has the sound of *z*.

The foreign sounds which have no equivalent in the English language are represented as follows:

K for the German *ch*, as in Bach: (**Bach**, *baK*).

N for the French *n*, as in Breton: (**Breton**, *bre toN'*).

ö for the German *ö*, as in Göttingen: (**Göttingen**, *gö'ting en*).

ü for the German *ü*, as in Blücher: (**Blücher**, *blüK'ur*).

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EQUINOX, the precise time when the sun enters one of the equinoctial points, or the first point of Aries about the 21st of March, and the first point of Libra about the 22d of September, making the day and night of equal length all over the world (see EQUINOCTIAL). At all other times the lengths of the day and of the night are unequal, their difference being the greater the more we approach either pole, while in the same latitude the difference is everywhere the same. The equinoxes do not divide the year into two equal periods, because, on account of the eccentricity of its orbit, the earth moves faster during the period from the autumnal to the vernal equinox than it does during the other portion of its orbit. See EQUINOCTIAL.

EQUISETUM. See HORSETAIL RUSH.

EQUITY, *ek'wi ti*, signifies natural justice, or equality of rights. A court of equity is one in which justice is applied to remedy a civil wrong. A court of common law is limited strictly by the established principles of law, while a court of equity is conducted on a broader basis; it applies justice on proved merits of all aspects of a case. In many cases no specific statute applies, but when decisions bearing on such cases are recorded they become standards for courts to follow in the future. See LAW, and references there given.

ERA OF GOOD FEELING, the term applied to the period of American history between 1817 and 1824, when there was virtually only one political party in the United States—the Democratic-Republican. Although President Monroe's reelection by an electoral vote of 231 out of 232 indicated little party opposition, the times were not without internal party strife among the various factions, and some of the bitterest contests in American history were taking place in Congress. See MONROE, JAMES.

ERAS'MUS, DESIDERIUS (1467–1536), one of the greatest scholars of the Renaissance period. He was educated for the priesthood and took orders, but spent his life as an independent scholar, living by his pen. He lived chiefly at Paris, Louvain, in England and at Basel. For a short period he was an assistant in Greek at Cambridge University. In scholarly attainments he was the foremost man of his age. He is thought of as a precursor of the Reformation, yet he was opposed to Luther and Calvin, and re-

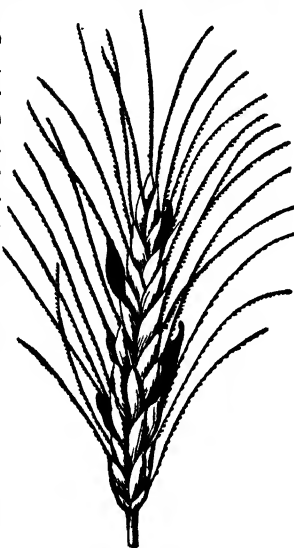
mained throughout his life a Catholic. He shunned extreme views and believed in the slow reform resulting from the spread of education. Soon after the printing press was invented he published a Greek Testament and numerous works of classical authors in Greek and Latin. His own writings in Latin, the regular medium of writing at the time, are modern in style and have a charm and an individuality which are a true expression of the man's character.

EREBUS, *er'e bus*, in Greek mythology, the son of Chaos. His domain was a lower world, named for him, beneath the earth's surface, through which the shades (spirits of the dead) passed on their way to Hades. His sister, Nyx, was the goddess of night, and was worshiped by the ancients with the greatest solemnity.

ERECTHEUM, *er ek the'um*, an ancient Greek temple, built in the fifth century B. C. It was the sanctuary of Erechtheus, the Athenian god of architecture, and of the goddess Athena. The plan embraced a large room seventy-four by thirty-seven feet, flanked on three sides by porticoes. Of these only the floors, columns and fragments of the entablature remain, but even in decay it is one of the noblest monuments of antiquity. The columns of the east and north porticoes are the finest remains of Ionic architecture in existence. The south portico, known as Caryatides, or Porch of the Maidens, is famous for its six beautifully-sculptured female figures which uphold the entablature. See CARYATIDES.

ERFURT, *er'foort*, GERMANY, a city in the Prussian province of Saxony, on the Gera River, fourteen miles west of Weimar. Erfurt is the center of the flower seed industry in Germany, and in this field it is perhaps the first city in the world. It has a fine cathedral, dating from the thirteenth century, and several handsome Gothic churches. The university, founded in 1378 and suppressed in 1816, was long an important institution. There are still a royal academy of science and a royal library with 60,000 volumes. The monastery (now an orphanage) was the residence of Luther from 1501 to 1508. The manufactures are varied, including clothing, machinery, leather, shoes, ironmongery and chemicals. Erfurt was one of the most important commercial towns of Central Germany in the Middle Ages. Population, 1925, 135,579.

ERGOT, *ur'got*, the altered seed of rye and other grasses, the change being caused by the attack of a fungus. The seed is replaced by a dense close-grained tissue largely charged with an oily fluid. Ergot is poisonous, and exerts a powerful action on the heart. It should never be used as a medicine except as prescribed by a reliable physician. As ergot is occasionally used for illegal purposes, its sale except on the prescription of a physician is prohibited by law.



ERGOT OF RYE

ERICSSON, JOHN (1803-1889), a famous engineer, born in Sweden. He served for a time in the Swedish army, removed to London in 1826 and later to New York. He is identified with numerous inventions and improvements on steam machinery and its applications. His chief inventions are his caloric engine, the screw propeller, which has revolutionized navigation, and his turret ships, the first of which, the *Monitor*, distinguished itself in the American Civil War and inaugurated a new era in naval warfare. See MONITOR AND MERRIMAC.

ERIC, *er'ik*, **THE RED** (950?-1000), a Norwegian navigator and explorer. An accusation of murder drove him from his native country to Iceland. About 984, having become involved in local feuds, he sailed westward and came upon an uninhabited island, later named Greenland. Eric's exploration of the island convinced him that it could be colonized, and he returned to Iceland to round up settlers for the project. The expedition sailed in twenty-five ships, fourteen of which reached Greenland. The colonies which were founded disappeared in about four centuries.

Leif Ericsson, son of Eric, is supposed to have discovered the North American continent in the year 1000. Commissioned by King Olaf of Norway to

Christianize the inhabitants of Greenland, he was blown off his course while on the voyage, and reached a land which he called Vinland, from its grapevines. See VINLAND.

ERIE, LAKE, next to the smallest, and the shallowest of the Great Lakes of North America, excepting Lake Saint Clair. It lies between lakes Huron and Ontario, with which connection is made at its western end by Saint Clair River, Lake Saint Clair and Detroit River, and by Niagara River and the Welland Canal (which see) at its eastern end. Its area is 9,960 square miles, a little greater than that of Vermont. Its surface is 573 feet above sea level and its greatest depth is 200 feet. The surface of Erie is eight feet below that of Lake Huron, but it is 326 feet higher than the surface of Lake Ontario. It is 240 miles long; the greatest width is forty miles.

Slightly over half of this lake belongs to Canada. There are no towns of importance on the Canadian shore, but on the Ohio shore are the large cities of Toledo, Cleveland and Buffalo, while the smaller cities of Sandusky, Ashtabula, Conneaut and Erie are of more than local note. Because of the shallowness of the lake, storms lash its waters into violent seas. See GREAT LAKES for chart of comparisons.

ERIE, PA., the county seat of Erie County, situated on Lake Erie nearly 100 miles northeast of Cleveland, Ohio; it is the only lake port of the state. The railroads entering the city are the New York Central, the Pennsylvania, the Bessemer & Lake Erie, and the New York, Chicago & Saint Louis. Three principal bus lines and two airports are available. The largest ships on the Great Lakes enter the land-locked harbor. The area of the city is 20 square miles.

Industry is the chief interest; the capital invested amounts to \$96,000,000. The value of the products exceeds \$120,200,000 annually; they include boilers, engines, gas meters, electric locomotives, power equipment and appliances, kitchen utensils, sterilizing equipment, steam shovels, pipe vices and tools, rubber products, paper and paper products, corsets, stoves and electrical appliances.

Public institutions and buildings are such as meet the needs of a modern city: the public library of 120,000 volumes, the public museum, the Y.M.C.A. and Y.W.C.A., the \$3,000,000 union depot, a branch of the Uni-

versity of Pittsburgh, the Villa Maria College and Mercyhurst College, both for girls, the Cathedral preparatory school and college for boys. The public and private schools occupy 41 buildings; there are 78 churches.

The parks number 16; Presque Isle Peninsula, comprising 3,200 acres of virgin woodland, a state park with 21 miles of bathing beaches, and five golf courses afford ample recreation privileges. The public stadium seats 20,000. Population, 1930, 115,967.

ERIE CANAL, a canal in New York state extending from Buffalo to Troy and Albany, connecting Lake Erie with the Hudson River. It is the oldest and most important section of the canal system known as the New York State Barge Canal. The Erie Canal was the first artificial waterway of importance constructed in the United States. Begun in 1817 and completed in 1825, it was a monument to the untiring efforts of De Witt Clinton, governor of New York during most of the time it was under construction. It was built by the state at a cost of \$7,602,000, and its completion marked a new era in the commercial expansion of the country.

When the canal was first opened to navigation it was 363 miles long, twenty-eight feet wide at the bottom, forty-two feet wide at the top and four feet deep. By 1835 it had become inadequate for the increasing amount of traffic on it, and an enlargement was then authorized. In the course of the next few years a number of improvements were made, and by 1862 the canal was widened and deepened. For a number of years the canal was neglected, but interest was revived late in the nineteenth century, and in 1903 the state of New York issued a bond issue for a thorough reconstruction of the canal.

There was adequate reason for the expenditure of large sums to make the canal serviceable. Almost from the year of its opening it was beset with competition from the advent of railroads. The Mohawk & Hudson Railroad was opened from Albany to Schenectady

in 1831; within ten years Albany and Buffalo had rail connection, paralleling the canal, and soon there was a line from Albany to New York. See **NEW YORK STATE BARGE CANAL**.

ERIS, in Greek mythology, the goddess of discord, sister of the war god Mars. Legend has it that Eris, indignant that she was not invited to the marriage festivities of Peleus and Thetis, threw into the midst of the assembled guests a golden apple, on which was inscribed, "For the fairest of the fair." Because of the jealous rivalry for its posses-



MAP OF ERIE CANAL AND NEW YORK CENTRAL RAILROAD
Note how railways later paralleled the canal.

sion, it has ever since been known as the "apple of discord."

ERITREA, *are tra'ah*, the smallest Italian colonial outpost in Africa, wedged between the Red Sea and Ethiopia, assumed an importance because of Italy's Ethiopian war quite beyond any assumption to recognition it has held since first occupied by white men, in 1885. In that year an Italian company bought from a local chieftain a spot of land on the coast at Assab for a coaling station; five years later a greatly extended area was named Eritrea by the government of Italy, in remembrance of "Mare Erythraeum" of the ancient Roman republic.

The Land. Along the blistering sands of the coastland white people find existence in "summer" almost unendurable in temperatures always above 100° and often reaching 120°; the "winters" are only a little cooler, for the equator is only 13° south of the southern boundary. Yet on this desert strip is Eritrea's only port at which ocean vessels may dock, the port of Massaua, one of

earth's hottest cities, nearly 200 miles up the coast from the original settlement. Massaua has a population of 15,000 natives and a few hundred Europeans, mostly Italians. The city is somewhat thriving as a port, for it is famed as the seat of a vast salt industry; white dunes that look like sand are solidly salt, an important export.

Back from the sea a few miles west of Massaua the country becomes mountainous; here, 40 miles by air and 80 miles by rail from the coast, is Asmara, the capital (19,000 natives, 3,000 Europeans), at an elevation of 8,000 feet, in a delightful climate. Asmara presents a clean, modern aspect, and here and in the vicinity the whites from the coast spend as much of the heated term as can be managed. Asmara is an attractive bit of Italy planted in the highlands of northeast Africa. Population of the colony, 625,000.

In 1936, after the Italian conquest of Ethiopia, Eritrea and Italian Somaliland were joined with Ethiopia under rule of a viceroy, as a part of the new Roman Empire.

ERMINE, *ermine*, or **STOAT**, *stote*, a name given to any weasel whose fur, short, soft and silky, turns white in winter. In winter it changes from a reddish brown to a yellowish white, and in intense cold to pure white. The tip of the tail is always black. The beauty of the fur makes it valuable for commerce. The ermine is difficult to capture. Most traps are useless, as the fur is injured in the animal's efforts to free itself. An ingenious device used to entrap it is a greased hunting-knife, placed in the snow to lure by its resemblance to ice, which the thirsty little creature seldom fails to lick. The intense cold causes the tongue to stick to the metal surface, where it is held fast.

Ermine has long been an emblem of royalty, and appears on heraldic emblems. See **FUR AND FUR TRADE**.

EROSION, *erozhun*, the wearing away of parts of the earth's surface through natural causes. The principal agents of erosion are rain, running water, waves, ice and the atmosphere.

Rain and Running Water. Rain water contains ammonia, carbonic acid and frequently small quantities of muriatic and nitric acids. These substances decompose some of the rocks on which the rain falls. When rain strikes the earth a portion of it soaks into the soil and penetrates to some distance beneath the surface. This water collects in cavities in various strata, and some of it re-

appears in springs. Another portion runs down the slopes, carrying with it more or less of the soil, dust and particles of decomposed rocks and depositing these on lower levels.

The different degrees of hardness at various points on the surface of slopes, as well as their original unevenness, cause the water to flow down them in rills and rivulets. Each of these cuts a channel for itself. Thus the slopes are made still more uneven by running water, and it is in this way that hillsides are sculptured in such a variety of forms. The deep valleys between the plateaus are excavated in the same way (see **CANYON**). The main stream in a valley also wears away more or less of the valley floor. A large stream like the Mississippi, flowing through a region of loose rock, will form a wide valley with broad, gentle slopes, but wherever the current is swift, the stream may have its channel defined by abrupt banks, which are usually low and contain here and there high bluffs. See **VALLEY**.

Waves. Waves are confined in their action to the shore line, but along the seacoast, wherever breakers occur, they are continually wearing away the rock. Waves also carry out with the undertow more or less sand and gravel from the beach. Thus the shore line is gradually extending. Similar effects are produced on large bodies of fresh water like Lake Superior, but they are not so distinctly marked nor so extensive.

Ice. Ice acts principally by breaking and crumbling rocks through the freezing of water. This so disintegrates the rock that particles of it are easily carried away by water. Wherever glaciers exist, their movement is attended with erosion, as well as transportation of material (see **GLACIERS**).

Atmosphere. The atmosphere works both by mechanical and chemical action. The oxygen, carbon dioxide, water vapor and other substances found in the atmosphere tend to decompose rocks and form new compounds. In the arid regions the wind wears away rocks in certain localities and denudes those in others. Much of the sculpturing in the Rocky Mountain regions is due to this cause.

ERRATICS, or **ERRATIC BLOCKS**, in geology, boulders, or large masses of angular rock in an alien environment, having been transported from their parent mountains by the action of ice during the glacial period. Thus, on the slopes of the Jura Mountains

immense blocks of granite are found, which have traveled sixty miles from their original location. Similarly, masses are found in numerous places in the United States. See BOULDER.

EERYSIPELAS, *er i sip'e las*, a very infectious disease, which is sometimes an epidemic in hospitals, especially military hospitals in time of war. It is not, however, a purely hospital disease, but may affect any persons who have been exposed to the contagion. It usually appears upon the head or face, in the form of an inflammation of the skin, accompanied by swelling and pain, and may terminate in fever and delirium.

Erysipelas is caused by germs which make their way into the skin by way of a cut or a scratch. Treatment consists in applying antiseptic dressings to the inflamed parts and administering tonics to the patient.

ERSURUM, *erz' room'*, capital of a province of the same name in eastern Turkey, on the route from Trebizond to northwest Persia. It is 6,250 feet above sea level and suffers extreme cold winter weather. The scenery in the vicinity is magnificent, with lofty ranges and long, broad valleys. The chief products are boots, saddles, jerked beef, grains and vegetables. It enjoys a large caravan traffic. This is an ancient Armenian city; the Seljuk Turks occupied it as early as 1201 A. D. A rampart surrounds the town and several fortifications occupy the neighboring hills; it is an important frontier fortress. Water is brought to the public fountains in wooden pipes. Population, 32,000.

E'SAU the eldest son of Isaac and twin brother of Jacob. The story of his loss of birthright through the craft of Rebekah and Jacob and of his quarrel and reconciliation with Jacob is told in these volumes under the subhead *Bible Stories*, in the article BIBLE.

ESCHEAT, in early English law, denoted a return of lands to a lord when the tenant left no heirs or has suffered from attainder or from loss of rights. In practice today, lands for whom no heirs appear when an owner dies becomes the property of the Crown. The scope of the old law has been much reduced by legislation in Great Britain.

In the United States, property that stands without living owner or heirs falls into the possession of the state. The laws of each state prescribe methods of administering such property. Lands acquired by escheat carry with them the same rights and liabilities that

affected them while under the control of the last owner.

ESCO'RIAL, or **ESCU'RIAL**, a remarkable building in Spain, near Madrid, comprising a palace, a convent, a monastery, a church and a mausoleum. It was built by Philip II between 1563 and 1584 and was dedicated to Saint Lawrence, in commemoration of a military victory won on the festival of the saint, in 1557. It is built on the plan of a gridiron, because Saint Lawrence is said to have been roasted alive on one. The church, the finest part of the whole building, is richly decorated and contains a crypt, or royal tomb, in which are buried all but two of the kings of Spain since Charles V. The dome is sixty feet in diameter, and its height at the center is about 320 feet. The library contains a valuable collection of some 30,000 books and manuscripts. The principal entrance to the palace is opened but twice during each reign, once to admit the king on his first visit to the place, and a second time when his dead body is carried through. Fire and lightning have frequently damaged the Escorial, but it has repeatedly been repaired, so that it represents to-day an expenditure of \$10,000,000.

ESCROW, *es kro'*, in law, an instrument in writing, under seal, held in the possession of a third party until certain conditions between the two parties signing it have been fulfilled. The document while in the hands of the third party does not operate as a deed or conveyance; it simply holds the property stationary as a guarantee of fulfillment of obligations. The deposit of the escrow places the described goods or land beyond the control of the grantor, and they are delivered to the grantee as soon as he has met the stipulated conditions.

ES'DRAS, **BOOKS OF**, certain books of that portion of the Old Testament known as *Apocrypha*. They are generally divided into the *First Book of Esdras* and the *Second Book of Esdras*. As ordinarily considered, the first book includes the book of *Ezra*, a portion of *Nehemiah* and the last two chapters of *II Chronicles*. The second book consists of the revelation of Esdras and somewhat resembles in its nature the book of *Revelation*. It consists of a series of visions regarding the mysteries of the moral world and the final triumph of righteousness. The descriptions are striking, and the language is sublime. See APOCRYPHA.



ESKIMO, an interesting race of people inhabiting parts of the Arctic regions through an east-and-west range of 3,000 miles. They call themselves *Innuits*, a word meaning *the people*; the word *Eskimo* is an Indian term which means *eaters of raw flesh*.

Description and Habits. These people are short in stature (about five feet two inches) and, as a rule, are rather fleshy, but not fat. Their faces are wide and oval;

their noses are flat, their hair jet-black and straight. Their complexion is naturally light-brown, but they usually appear darker, for the Eskimo are seldom clean. More civilized people criticize them for their uncleanly habits, yet the most fastidious in like environment might in even a generation or two acquire many of the faults of these little people in the dreary wastes of the north-land. Sometimes homes are *igloos* of snow; frequently in the short summer in some parts they acquire huts of driftwood and skins. Bathing has been practically unknown; there has been almost entire lack of facilities.

Contrasted with their unclean habits, they possess attributes which more civilized peoples often lack. The Eskimo never takes what belongs to another; the only government is that of the family, for they need no complex systems of control. Common ownership of the products of the hunt is the rule in many localities.

The Igloo. Once the igloo was practically the only winter home of the Eskimo; now it is resorted to mostly as a temporary structure quickly built when one is traveling, though when weather is cold it may serve some time as a shelter. An igloo can be built in a few hours; it is formed of cut blocks of snow or snow and ice. Entrance is through an opening so small that inmates are obliged to crawl in and out on the hands and knees. The heating and lighting plant of the igloo is a sort of lamp, made frequently of soapstone, hollowed out like a shell. This is filled with whale blubber for oil, and the wick is of dried moss. This lamp pro-

to insure what the Eskimo consider a comfortable temperature. Skins line the igloo to keep dripping water from the inmates. An igloo is sometimes large enough to accommodate fifty people.

The Eskimo's Food. These little people live on a principal diet of fats and oils; in winter they must have heat-producing foods almost exclusively. During the coldest months they eat the fat meat of seals and whales; in summer they travel long distances sometimes to find deer, bears, rabbits and foxes. Fish are also caught in summer. Some of this meat is usually packed away for winter, to provide variety in the menu. Often it is placed in layers on the floor and covered with skins; in the cold months, then, they begin to eat their floor, and reach the ground by spring! Within recent years thousands of reindeer in Alaska, the first few hundred being brought there by the Bureau of Education, have furnished meat in increasing quantities.

Their Clothing. The dress of men and women differs little. Everybody wears trousers, boots and a jacket with a warm hood which can be pulled over the head, nearly enveloping it. The women's boots are higher than those of the men. Women carry their infant children in special hoods. Clothing is almost entirely of furs, excepting along the coasts, where white people induce the natives to buy coarse, heavy cloth, which is, however, less desirable in the intense cold of winter.

Mode of Travel. For many generations the Eskimo dog has been the beast of burden. These dogs, trained and hardened to endure great privation when necessary, hitched from six to ten in tandem to a sledge, can run sixty miles a day. The reindeer, referred to above, by thousands are found now in Western and Southwestern Alaska; they are adapted to the work of the natives, who also eat their flesh and make clothing of their skins.

On the water the male Eskimo row swiftly in a peculiar boat known as a *kayak*, which is a fishing boat; the *umiak*, or family boat, is used by the women. The *kayak* is very light, from ten to twenty feet in length and less than two feet in width, and is made of skins stretched over ribs of bone or wood. It is entirely covered, with the exception of a small opening large enough to receive the

the same material as the *kayak*, is large enough to hold a family and the few household goods. See **BOAT**; **ALASKA**.

Their Occupations and Education. Eskimos live in "the great white silence." Their lives must run along simple lines. The man must always hunt and fish, to supply the great amount of food needed in the cold climate. Wherever white men are encountered they have become tradesmen, selling skins, whalebone and eiderdown; the most important article received in exchange is the rifle; with the coast natives it has succeeded to some extent the spear and harpoon, the natural and primitive weapons of the hunt. The women do all the remainder of the work.

All the people like to play. They race, play a game resembling football, engage in card playing, wrestling and the like. The children have their toboggans, they play hockey, and they "play horse" as do white children, though their fancied horses are dogs, for they never have seen a horse.

The Eskimo are decreasing in number, and now there are few more than 38,000 of them. Of this number 15,000 are in Alaska, 15,000 in Greenland, 5,500 in Canada, and 2,500 in Labrador. They are comparatively short-lived, due to unhygienic manner of living and to the introduction of contagious diseases brought by white people. The United States government, through numerous schools, whose teachers are heroic in their isolation, is teaching them how to live more in the civilized manner, and is meeting with encouraging support from the natives.

ESPARTO, a grass growing in Spain and North Africa, long used in the manufacture of cordage, matting and similar articles, and now extensively employed in paper making. It grows to a height of three or four feet, and bears gray-green leaves which sometimes grow to be three feet in length.

ESPERANTO, an artificial language created by Dr. Zamenhof of Warsaw, who, under the assumed name of *Dr. Esperanto*, published his first pamphlet upon the subject in 1887. From this the language takes its name. Esperanto is claimed to be the best attempt so far to produce an international language. The vocabulary is formed by selecting first the root words which are common to all the principal European languages; second, those that are common to all but one; then those that are common to all but two,

simple. By means of an elaborate system of prefixes and suffixes the vocabulary is given an almost unlimited extension; thus, *bona* means good, *malbona*, bad; *fermi* means close, *malfermi*, open. The suffix *in* denotes feminine; *knabo* means boy, *knabino*, girl. Several books have been published in Esperanto. Other languages competing with Esperanto for place as an international language are Volapuk, Ido, Neutral and Bolak.

ESQUIMALT, *eskwi'malt*, **BRITISH COLUMBIA**, on Vancouver Island, three miles from Victoria. Esquimalt has a fine harbor, naval yards and fortifications. It has a dry dock, 1,150 feet long, capable of accommodating the largest vessels. The chief industry is shipbuilding. Population, 1931, 3,274.

ESSAY, a written composition on some special subject. Essay writing is an important part of the language work of English courses from the lower grades through high school. The younger pupils are learning to write essays when they are asked by their teacher to write out a description of their favorite animal pet or to tell which one of their studies they enjoy most, and why. Later in school life they are given more difficult subjects, such as book reviews, discussions of current events, or descriptions of scenery.

No matter what the subject of the essay may be, it must contain the opinions of the writer on that subject. It may be in the form of description, a discussion or an argument, or it may be on a wide variety of subjects—history, politics, science, literature, religion, sociology, etc. Essays should be carefully planned and have an orderly arrangement. It is a good idea to make an outline before one starts to write, if the essay is to be of considerable length. Suggestions along this line will be found in these volumes under the heading **THEMES, OUTLINES FOR**.

In literature the essay has had an important place since the time of Montaigne (1533-1592). He was a French author who wrote a series of delightful essays of an informal character. In English literature there is a body of essay writings of permanent value. Important works in this field include the essays by Steele and Addison contained in the *Tatler* and the *Spectator*; Bacon's *On Studies*; the *Essays of Elia*, by Charles Lamb; Macaulay's *Milton*; Carlyle's *Burns*; the essays contained in Ruskin's *Sesame and Lilies*; and numerous others by such writers

as Newman, Haslitt, De Quincey, Stevenson, Benson, Chesterton, Shaw and Wells. In American literature the essay form was successfully handled by Irving, Emerson, Lowell, Holmes, Thoreau, Curtis, Howells, Mabie, Crothers, Agnes Repplier and others.

Related Articles. The following list contains the names of the more important essayists whose biographies are found in these volumes:

Addison, Joseph	Lamb, Charles
Bacon, Francis	Lowell, James R.
Burroughs, John	Mabie, Hamilton W.
Carlyle, Thomas	Macaulay, Thomas B.
Chesterton, Gilbert K.	Montaigne, Michel
De Quincey, Thomas	Newman, John H.
Emerson, Ralph W.	Ruskin, John
Goldsmith, Oliver	Shaw, George Bernard
Holmes, Oliver W.	Stevenson, Robert L.
Howells, William D.	Thoreau, Henry D.
Irving, Washington	Wells, Herbert G.

ESSEN, GERMANY, a town of Rhenish Prussia, eighteen miles northeast of Düsseldorf, noted during the last quarter century as the most important center of munitions making in Germany, and as one of the greatest in the world. Here is located the great Krupp industrial establishment, which has hundreds of branches in various parts of Europe (see KRUPP, FRIEDRICH ALFRED). The town is an old one, and its beautiful cathedral dates from 873. Its industrial development, however, is of comparatively recent date; its growth is due to the Krupp works. Population, 1933, 654,538.

ESTATE, the interest which a landholder possesses in his land. The term arises from the fact that under the old feudal system the ownership of all land was vested in the king, and all private holders of land were his tenants. The interest of such a tenant was called his *estate*, and this was always less than absolute ownership. Thus various classes of tenancies or estates were developed, and these persist in law to the present time. Of these estates three are called *freeholds*. They are the *fee simple*, that is, the right to dispose of land in any way, which suits the possessor, who is in absolute ownership; the *fee tail*, which gives the possessor the right to dispose of his land only to his own issue, and the *life estate*, which gives the possessor the right to control the land only for the space of his lifetime. The estates which are not freeholds are various forms of tenancies, the difference usually being in the period over which the contract extends, whether for years, for life, from year to year, terminable at the will of either party or at the sufferance of the so-called owner of the land. See **REAL PROPERTY**.

ESTHER, *es'tur*, a Jewess maid who became queen of Persia. Her story is told in these volumes in the article **BIBLE**, subhead *Bible Stories*.

Book of Esther, the last of the historical books of the Old Testament. It takes its name from the Jewish maiden whose history it gives. The book is written in Hebrew, with many Persian words, which seems to prove that its date was during the Persian rule in the reign of Artaxerxes, 465-425 B. C. The word *God* does not occur in the text; neither is the book alluded to or quoted in the New Testament, and with the exception of Esther's fast no religious act is spoken of. The Jews of to-day, however, celebrate the feast of Purim in token of the deliverance of their people through Esther's aid.

ESTHETICS, *es'thetiks*, a word derived from the Greek, meaning *perceptive*, and applied to that branch of philosophy which concerns itself with the beautiful in nature and in art. It was first used in this sense by Hegel, early in the nineteenth century; prior to that time there had been various theories of the beautiful. The German philosopher Baumgarten believed that the mind possesses a special beauty sense, or faculty of appreciation, and that this was not an intellectual gift, though dependent on the intellect. The idea of beauty, as has been pointed out, is "not positive, but depends upon individual taste;" hence the wide diversity in the product of artistic effort. Although there is no ultimate criterion of beauty, every work of art must observe certain fixed laws of beauty; and whether the artist belongs to the school which finds its highest expression in trying to imitate nature, or to the cult which regards art as independent of nature, he must not, if he wishes to be taken seriously, depart too far from established rules.

ESTONIA, a Baltic province of Russia before 1918, now a small republic, lies on the east coast of the Baltic Sea, in about the latitude of Leningrad. The Gulf of Finland separates Estonia from Finland on the north, and Latvia lies directly south. The area is 18,353 square miles; the population (1933), 1,124,000. Tallinn (once Reval), a seaport, is the capital; population, 134,000. The Estonians are related to the Finns, and under the old Russian régime they steadily resisted all efforts of the government to Russianize them, clinging to their use of the Finnish lan-

guage and their acceptance of the Lutheran creed. A small aristocratic minority is German in blood and sympathy.

Like the other Baltic provinces, Courland and Livonia (now Latvia and Lithuania), Estonia set up an independent government in 1917, on the downfall of the Russian Empire, to be free from Russian oppression. In 1918, when Russia surrendered to Germany and signed the Treaty of Brest-Litovsk, German armies entered each of the Baltic provinces, overthrew the native governments and set up a new régime under German leadership. The collapse of Germany itself, in November, 1918, caused a withdrawal of the German forces, but the Esths were not left in peace. Trotzky's Bolshevik soldiers were sent against them, and for months there was bitter fighting. In January, 1920, peace was agreed upon, leaving Estonia free. See RUSSIA; WORLD WAR; LATVIA.

ESTUARY, *es'tu a ri*, a widened channel connecting a river with the ocean or other large body of water. It is really a greatly-broadened river mouth, resulting originally from a drowned valley, then made larger through the centuries by erosion. Estuaries are usually comparatively shallow, for they are continually filling with sediment brought to them from upper courses of the rivers, and often shifting sandbars obstruct navigation. This shifting results, in estuaries joining the ocean, from advancing and receding tides. In many estuaries, as in those on the Bay of Fundy, the tides rise with great rapidity. Examples are Delaware Bay, those in Chesapeake Bay, the Thames, the Severn and the Elbe.

ETCHING, the process of engraving metal plates by means of an acid. The plate is cleaned and covered with an *etching ground*, which is a composition of Egyptian asphaltum, wax and pitch. This protects the surface from the action of the acid. The design is then cut through this coating with steel tools, called *etching needles*, and the plate is placed in a weak solution of nitric acid. The acid eats, or "bites," the design into the plate. The different degrees of light and shade are produced by etching some portions of the plate more than others. After the lines which require but little etching have been formed, that portion of the plate is again covered with etching ground and the action of the acid on it stopped. Some of the finest works are reproduced by combining etching and en-

graving in the preparation of the plates. See ENGRAVING; ZINC ETCHING.

ETESIAN, *e'te'shan*, WINDS, the north and northeast winds which blow across Southern Europe and the Mediterranean during the summer. Apparently they are an indraft towards the Sahara. They are strongest in July and August.

ETHELWULF, *eth'el woolf* (?-858), the father of Alfred the Great. His father, Egbert, gave him the three petty kingdoms of Kent, Essex and Sussex, which he united under one government. On the death of Egbert, Ethelwulf succeeded to the higher throne of Wessex and transferred the subordinate kingdom to his son Ethelstan. His reign was rendered uneasy by Norse invaders, who were with difficulty driven out. On his return from a journey to Rome he found that his son Ethelbald had usurped his throne. Ethelwulf's people were loyal, but the usurper's following was large enough to have stirred up civil war. To avert this the king abdicated the throne of Wessex in favor of Ethelbald and took for his own dominion the little kingdoms he had at first governed.

ETHER, *e'thur*, a colorless liquid with a sweetish smell, used extensively in surgery because its fumes make the patient insensible to pain. Its chemical name is *ethyl ether*. Ether is about three-fourths as heavy as water, and is somewhat soluble in that liquid. Dr. Crawford W. Long of Georgia, in 1842, discovered its value as an anesthetic. A Boston dentist, William T. G. Morton, was the first person to use it regularly in dentistry (1846), and since then it has been one of the most valuable anesthetics known. It is considered safer than chloroform (which see), and its disagreeable after-effects, chiefly nausea, may be lessened by freeing the drug from all impurities before administering it. Today ether has been superseded in some types of surgical cases by newer anesthetics, such as ethylene and twilight sleep.

ETHER, the medium through which light, heat and other forms of energy are transmitted. Scientists tell us that the rays which the earth receives from the sun could not reach our planet unless they had some medium through which to travel. Accordingly, they suppose all space to be filled with an extremely rare substance which has neither weight nor color, and they call it ether. Of the nature and property of this substance scientists know very little. See LIGHT.



ETHICS, *eth'iks*, the science which treats of the nature of the moral obligations one person owes to another and to his community at large; it outlines those rules which should determine conduct. Some writers on the subject declare it to be the science of ideal humanity, and this it really is. It may be best not to consider it generally in such exalted sense, for the teaching of ethics will be more effective if there is

carried the impression that it is possible easily to measure up to the standards set. Ideal humanity is something the world should strive for, but we are easily discouraged in the belief that such a state can soon be reached. Let us, then, say that our subject goes not beyond an inquiry into the nature of what is good, a study of that which is preferable and desirable; an investigation into what is right and what falls clearly in the line of duty. We prefer this middle ground because it is not at all theoretical; when one theorizes there is always danger that others will declare him visionary. What we all need is practical precept and principle, so plainly stated that there is no escape from acceptance of the truth. Knowing the way, then, or having a guide, makes it easier for us to walk uprightly.

Importance of Moral Training. Surely parents and teachers should not underestimate the value of ethical culture. In the right moral atmosphere—we do not mean strained, affected Puritanism—where every act seems the entirely appropriate thing and nothing violates the injunction, "Let everything be done decently and in order," the child establishes ethical standards without knowing it. Every child's moral nature reflects his surroundings; when the parent, the teacher, the state, eliminate wrong and injustice, the ideal humanity referred to will be a reality. Parents give children their earliest surroundings, and stamp upon them the impress of earliest influences; by the time the task of mind- and character-building is passed on to be shared with the teacher a great deal in the way of training has been accomplished, for good or ill, which is to be

permanent. It is a pity, but it is true, that habits are frequently formed by the young through the faults of their elders, yet we blame the wayward child for the traits he has developed. In all fairness, this should not be done. A very wise man said that the moral education of a boy or girl should be begun with the grandparents. We readily understand what he meant.

Especially Needed To-day. While moral training has always been important, it is particularly so at the present time, for the following reasons:

1. In a system of democratic government the laws of the country derive their authority from the consent of the governed. The strongest safeguard against lawlessness and the enactment of vicious laws is a public moral sentiment which will not tolerate the one nor support the other.

2. Our present industrial system separates employer from employe, parents from children; creates classes in society, and makes practically impossible the old-fashioned home with its benign and sacred influences. Unless special emphasis is placed upon moral training during childhood, the public standard of morals will be lowered.

3. Our complex life tends to a confusion of moral ideas on the part of some. There are altogether too many men who possess a "stratified conscience," that is they have one conscience for their home life, another for their church life, a third for their social life, and a fourth for business. "Mr. A is the soul of honor in his private life, but in business he is not to be trusted," says one. "Mr. B. is a very faithful attendant upon the services of his church on Sunday, but look out for him on the other days of the week," says another. Unfortunately, the conditions here described are so numerous as to make the above examples commonplace. We say that a person following different moral standards lacks principle, and this is true; but he lacks as well a moral training which would have given him a clear conception of right and wrong and developed in him the power of deciding for and adhering to the right.

Recognizing the importance of moral training—the kind which in most cases may accomplish its object—we consider it a high privilege to present the helpful material found in the pages which follow. The principles stated are fundamental, and the purpose of the article is to show parents and teachers how they can aid those under their charge in gaining high ideals of right and in forming the habit of maintaining those ideals. To be aware of ideals is not sufficient; to strive to reach them in every-day affairs and live according to them is greatly to be de-

Outline on Ethics

Right and Wrong

Impulse

Action

Immoral Acts

Non-Moral Acts

What a Moral Act Includes

Knowledge

Desire

Choice

Execution

Ideals

Heredity

Early Training

Public Opinion

Associates

Change of Ideals

Moral Standards

Helpful Suggestions

Environment

Mental Attitude

Example

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Self-Reliance

Reason and Judgment

Questions for Discussion

sired. The accompanying outline will assist in the study of the article.

Right and Wrong

Impulse. Every idea has in it what may be called an impulsive element, that is as soon as the idea is entertained there comes along with it a tendency to carry it out in action. In children, and in some people of mature years as well, this element is so strong that it leads to immediate execution of the idea, regardless of the consequences. People in whom this element is strongly developed are called impulsive. If their acts are disastrous either to themselves or to others, and they are asked why they do such things, the usual reply is, "Oh, I did it before I thought," or "I didn't think."

The thoughtful man is inclined to censure impulsive people, but he should not condemn impulse, for in impulse lie the beginnings of action. The impulsive or motor element in ideas should be brought under the control of the will and be guided by reason. In this way it will be led to manifest itself in acts that are beneficial to the individual and help-

ful to those with whom we associate. In brief, impulse properly guided leads to right action. Without guidance it is liable to lead to wrong action. One of the first steps in moral training consists, therefore, in helping the child to gain control over his impulses.

The child is particularly a creature of impulse; the reason and the will develop slowly, and for the first ten or twelve years of his life the child is moved to action more by his feelings than by any other power. Parents and teachers who understand the training of children recognize this condition and endeavor to keep the children under their charge in a happy frame of mind. In a state of happiness the desirable emotions are active, and these in turn lead the child to right action in his relation to others.

Moral Acts. What is a moral act? Do all acts contain a moral quality? While there may be some differences of opinion upon these questions, it is generally accepted that moral acts are those which are concerned with our relation to others, or with the development of our own character. For instance, casting one's vote is a moral act. In his vote the citizen registers his choice for officials to administer the law or for measures which affect the welfare of the state or community. His choice affects not only himself but those with whom he is associated. Again, a boy's obedience to rightful authority, as a request or a command of his father or mother or his teacher, is a moral act. It shows that he recognizes and conforms to the proper relation which he sustains to the one making the request or giving the command.

Acts relating to the development of our own character cannot be wholly separated from acts relating to others. What we are determines what we do. On the other hand, what we do helps to make us what we are. A good illustration of this class of acts is found in those acts which are concerned with the formation of personal habits, such as truthfulness, honesty and the like.

Immoral Acts. Acts which are contrary to the welfare of society and of the individual are immoral. Indulgences in an appetite for intoxicants is immoral because their effect is injurious both to body and mind. Appropriating that which belongs to another without his consent, or without giving him an equivalent in return, is immoral. Deception in any form is immoral, and to the above list many other illustrations can be added.

Non-Moral Acts. A non-moral act is one which sustains no relation to others and will have no specific effect upon one's character. Such, for instance, is the swinging of the arm when walking; multiplying one number by another simply for the multiplication or when there is nothing depending upon the result. In the discussion of morality non-moral acts are usually given little or no consideration.

What a Moral Act Includes. A complete moral act brings into play all the mental powers. It consists of the following steps:

1. **Knowledge.** You must know whether the contemplated act is right or wrong before you can determine its moral quality.

2. **Desire.** The knowledge gained leads to a desire to perform the act.

3. **Choice.** Knowledge and desire lead to decision. You choose to do or not to do.

4. **Execution.** Having made the choice, you proceed to carry it out in action. The act is performed or it is dismissed from the mind.

A concrete illustration will enable us to fix these steps more clearly in mind. Henry, a boy of twelve, started for school one morning in time to enable him to walk the mile between his home and the schoolhouse and be in his seat when school called. Before he was half-way there he discovered a neighbor's colt so entangled in a wire fence that the animal was liable to serious injury unless released at once. Upon examination Henry found that unaided he could not release the colt. He saw that the colt was in danger (knowledge); he therefore wished to release it (desire), but if he went for help he must be late at school. Which should he do—go for help or go on to school? He decided to return home and get help (choice). He no sooner reached this decision than he started for home (action).

The reader will be interested, possibly, in analyzing a number of his own acts after this plan. In the study of the illustration, or in the analysis of his own acts, however, the reader should bear in mind that the last step is the crowning achievement, and that unless this step is taken, the others are of no value. Many a young man can trace the beginning of his downfall to his failure to act upon the good resolutions he made.

Ideals. Though we may understand that a moral act is a right act, it is not always easy to decide whether an act is right or wrong. Such is the difference of opinion, that the same act is often considered right by one and

wrong by another. The questions "What is right?" "What ideals shall I follow?" and "What ideals shall I lead those under my charge to follow?" are constantly before the conscientious parent and teacher. If we would lead those having less experience than ourselves in the paths of right, we must first of all be familiar with those paths ourselves. Our ideas of right and the ideals that we form are shaped by a number of influences; chief among them are the following:

Heredity. Everyone is born with certain inherited tendencies. These become more or less prominent in childhood and exert an influence over one's entire life. These tendencies may be beneficial or injurious. They are modified to a greater or less extent by environment and training. If given proper attention in childhood, inherited tendencies can usually be brought under the control of the will. Those which are undesirable should be suppressed, and those which are beneficial should be strengthened. Many people assign to heredity a much larger share of responsibility in the development of character than justly belongs to it.

Early Training. We never wholly depart from the teaching of the first ten years of our lives. The ideas of right and wrong received during these years abide to a greater or less extent in our moral consciousness. The early moral training, both direct and indirect, which a child receives is therefore of the greatest importance.

Thomas lives in a home whose inmates are kind and courteous to each other, and whose atmosphere is pleasant. He is taught to be kind, truthful and generous. By the time he is ten years of age he has learned that these virtues are right and that their opposites are wrong. Andrew lives in a home where there is constant strife; the inmates exercise their ingenuity in deceiving each other and in trying to gain some advantage over their associates. To Andrew lying and selfishness are virtues, and truthfulness and generosity are weaknesses practised only by those who have not sufficient courage to withstand their fellows. These boys go out into life with directly opposite moral ideas as the result of their home training. Between these extremes are many grades of moral code, each formed by home training and association.

Public Opinion. Every social group, whether of children or adults, has its moral

code, and failure to conform to this code is a cause for disapproval, if not for censure and expulsion. This code expresses the moral sentiment of the group, be it large or small, and this is what we usually mean when we speak of public opinion. It requires courage to stand against public opinion. Let Thomas remove to a locality where the most of his boy associates are of Andrew's type, and he can remain true to his moral code only by constant struggle and possibly an occasional fight. If Thomas is a lad of weak will, he will soon yield to his companions and adopt, with possibly some mental reservation, a good portion of their moral code.

The case of Thomas is that of a large number of people of older growth. When removing from one locality to another they often find themselves at variance with the community they have entered. What shall they do? Shall they adhere rigidly to their established moral code and be looked upon as "queer," "Puritanic," and so on, or shall they overlook these points of difference and conform to the usages of society? These are among the most important questions that ever confront a young man or a young woman upon leaving home, and their decision often marks the turning point in the person's life.

A young person of good moral training and strong will will not give up those moral principles upon which his character is founded. Furthermore, he will adhere to such virtues as truthfulness, honesty, sobriety and industry. However, if one's moral convictions are not firmly fixed, one is very liable to change one's moral standard, because in so doing the individual follows the line of least resistance.

Earnest people who believe the moral code of society to be partially wrong refuse to conform to those beliefs and practices which their conscience will not approve. Such people are staunch moralists, and although the thoughtless may deride them, their influence in a community is always good. In time this influence usually wholly changes or in part modifies the objectionable practices. The reformer not only refuses to adopt the moral code of society, but he openly and aggressively goes to work to change public opinion until it shall coincide with his views.

Associates. One's ideas of right are more or less influenced by the opinions of those with whom one comes in daily contact and by the opinion of intimate friends. When

two people are associated, the stronger influences the weaker and the result is a modification of ideas. This influence is much stronger with children and young people than with those of more extended experience. We can, therefore, see the necessity of safeguarding the young from evil associates. The saying of the wise man, "Keep thy heart with all diligence, for out of it are the issues of life," is as potent now as when it was uttered three thousand years ago.

Change of Ideals. To the active mind the ideal of to-day is different from that of yesterday. Every day sees advancement; man's view of moral truth is broader and his insight into moral principles is deeper. This growth does not necessarily imply the forsaking of old principles and the adoption of new ones. It is more likely to mean the discovery of new opportunities of applying these principles, and with each new application the strength and significance of the principles are increased. In this way our moral ideas expand. Men and nations regard each other with greater respect and kinder feelings to-day than they did a century ago. The ideal hero of the fifteenth and sixteenth centuries was the warrior; the ideal hero of the twentieth century is the man who can prevent war. Ex-President Roosevelt gained greater renown by bringing about the treaty which closed the Russo-Japanese War than any military or naval commander in that conflict. This is also true in local communities; the man who is held in highest esteem is he who uses his talent in promoting the peace and welfare of the community.

Helpful Suggestions

Environment. The body exerts a strong influence over the mind. While now and then we find a brilliant intellect associated with a weak and sickly body, in general, health and vigor of the body lead to a clear intellect and a clear conscience. The surroundings of children should be pleasant and of such nature as to give them the bodily comfort necessary to a happy frame of mind. Plain, nourishing food and loose, comfortable clothing are important factors in moral training. Children who live in the country have greater advantages for the development of character than many of those who live in the city. The country child communes with nature and learns many of her secrets. For a portion of the time, at least, his companions

are birds, plants, animals, trees, flowers, verdant hills and running brooks. The city child may be confined to streets and alleys for his playgrounds and may have vicious companions only for his associates.

Whether in city or country the home life should be made attractive. There should be no place where the child can find so much pleasure and enjoyment as at home. An atmosphere of love and kindness should pervade the home, and through his association with the other inmates, as well as by precept and example, the child should be led to practice the virtues we have named.

Mental Attitude. The mental attitude exerts a strong influence upon character. The child who is always happy is kind, truthful and honest. His desirable feelings are constantly active and they give little or no opportunity for fear, anger, hatred and other undesirable emotions to appear. Teasing, nagging and scolding by those who have the care of children are reprehensible, and their practice is a serious obstruction to the development of right character.

Books. A word should be said about the value of reading as an agency in the formation of character. Next to friends and associates, books exert the greatest influence over the young. A story like Ruskin's *King of the Golden River*, Hawthorne's *Great Stone Face*, Longfellow's *Evangeline* and scores of others that might be named, whether in prose or verse, will do more toward the development of character than any number of discourses on duty, honesty or other virtues. Many maxims gleaned from books when memorized are also helpful and often inspiring.

Fortunately, school and other public libraries are now so common, and good books can be procured at such slight expense, that suitable reading can be placed in the hands of all. Just here a word of caution may not be out of place. The young should be safeguarded from vicious literature as carefully as from evil associates. Both exert a baneful influence. Inhibition, or the power to arrest a previous action, is the highest prerogative of the will. The wise use of this power shows that the will has been well trained.

Self-Restraint. Thrice armed against evil is that young person who during childhood learned to say "No" and to stand by it. In the development of character restraint is as essential as action. One is led astray by first

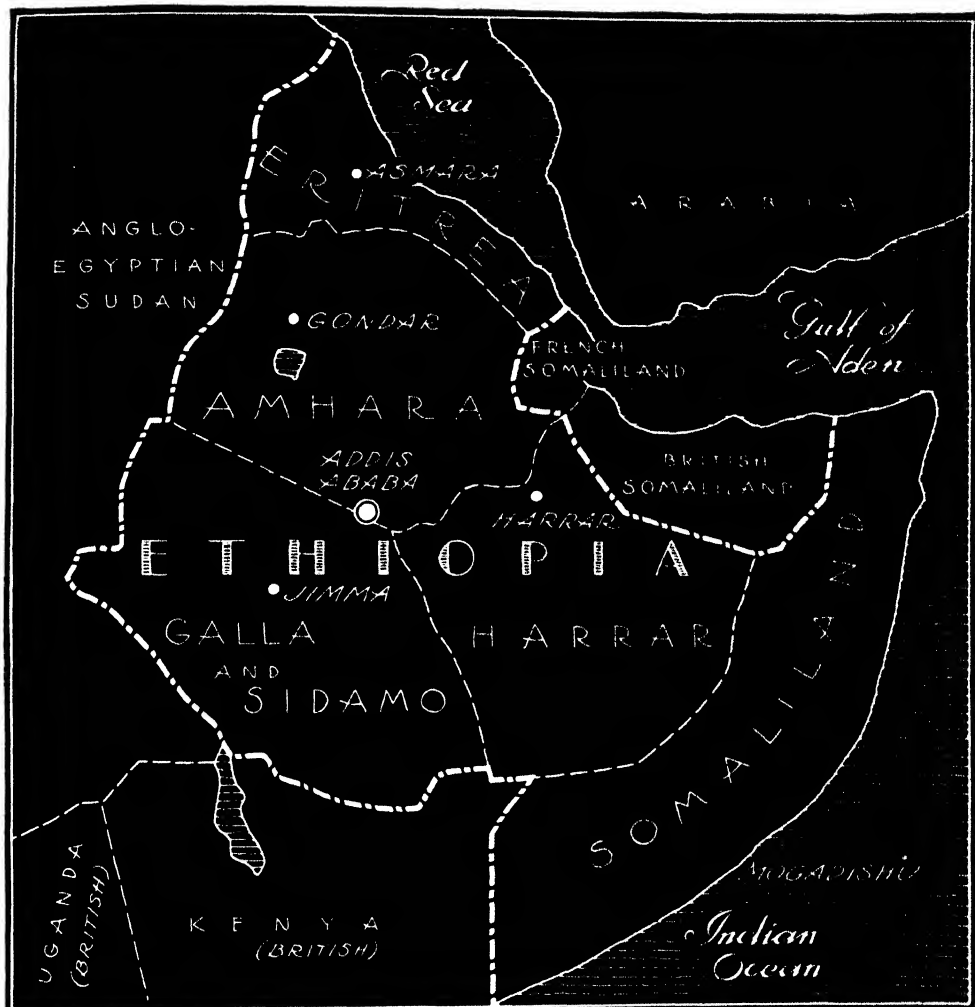
consenting to little things which are wrong. One step leads to another, and thus the character is lowered. Resistance to temptation must be acquired in the home if it is to be acquired at all.

ETHIOPIA, *e thih o' pih ah*, until 1936 one of two independent countries of Africa, the other being the negro republic of Liberia. The two lie on opposite sides of the continent. Ethiopia, officially Abyssinia until 1923, was an empire whose people number about 10,000,000, within an area estimated at 350,000 square miles. They are of colored and mixed races, and the most enlightened follow an ancient form of Christianity known as the Coptic religion.

The country had remained independent in late years by virtue of an agreement entered into in 1906 by Great Britain, France, and Italy to maintain, so far as it should be within their power, its completely independent status. This pact was violated in 1935 by Italy, when its government began against Ethiopia what it termed a colonial enterprise to conquer the country and make it an outlet for the overcrowded homeland.

The Land and Its Surroundings. Ethiopia lies entirely inland. North and east is Eritrea, a colony founded in 1885 when an Italian company bought from a native prince a small coastal area at Assab for a coaling station. From this beginning the important Italian colony of Eritrea developed. South of Eritrea is a small section, French owned, that is French Somaliland. Below this colony is British Somaliland, considerably larger. East and south of this, extending around Ethiopia at the south and joining the British colony of Kenya, is Italian Somaliland, covering a large but not valuable area. These four colonial enterprises occupy all the coast line thereabouts. On the west lies Anglo-Egyptian Sudan, under British control.

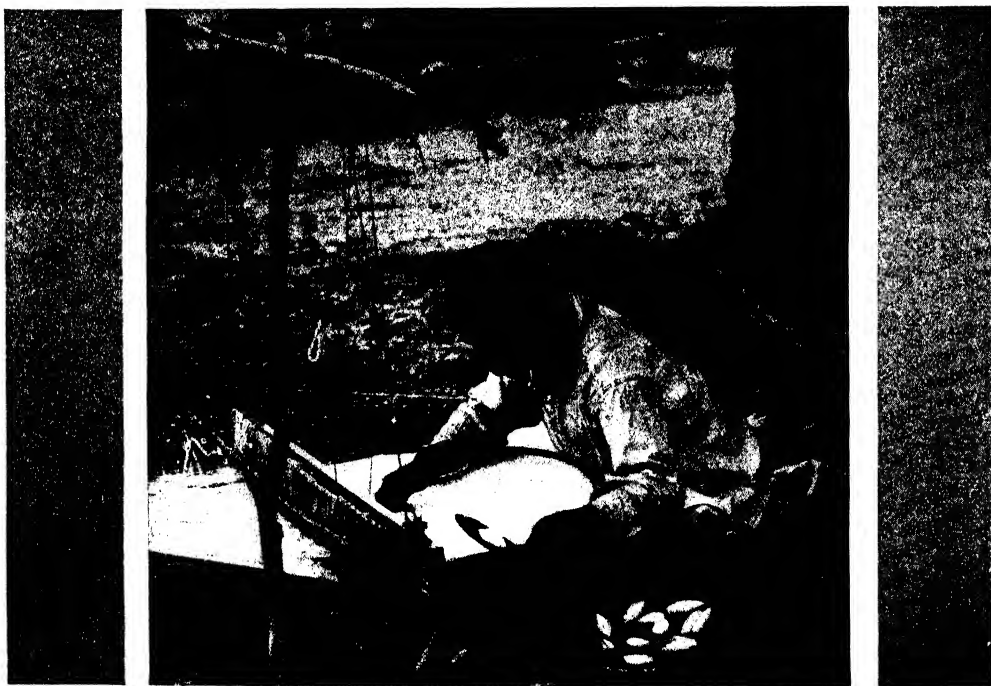
Inland from the sea and extending into Ethiopia in some places for more than a hundred miles, are intensely hot desert areas; the latitude here is only 4° to 14° north of the equator. These arid regions are of no value to white men, and they contain few natives. Farther inland, the land rises to plateaus and tablelands from 3,000 to 13,000 feet in height. The pleasant interior, where the capital city, Addis Ababa, is located, has fairly good protection from invasion in its surrounding mountains, rugged, lofty, and



BUILDING A NEW ROMAN EMPIRE

With the conquest of Ethiopia in 1936, Italy ceased to be a kingdom and by government decree there was established a New Roman Empire. Its homeland is the Italian peninsula; its chief foreign possessions have been Eritrea, along the Red Sea; Italian Somaliland, on the Indian Ocean, southeast of Ethiopia; and Libya Italiana (Libya), on the North African coast, between Tunisia and Egypt. The government of Mussolini has divided Ethiopia into the governmental districts of Amhara, Galla and Sidamo, and Harar (Harar), and over the conquered country has established a viceroy; Somaliland, southeast, and Eritrea, north, are included within the vice-regal district.





Ewing Galloway

TYPICAL SCENES IN ETHIOPIA

Above, an Ethiopian chieftain, with a group of his foot soldiers; the conquest by Italy destroyed their prestige. Below, a native weaver, operating a crude portable loom.

impressive in their grandeur. In the north-west is Lake Tana (Sana; Tsana), the source of the Blue Nile, necessary to Egypt's fertility, for Egypt is the "gift of the Nile."

The Seasons. Ethiopia has two seasons, the wet and the dry. The wet season begins about the middle of June, with astonishing regularity as to date, and rain is practically continuous and torrential until late in September. The dry season then begins. Often what are known as the "little rains" come for a few weeks intermittently in January and February. Heat in the desert areas frequently reaches 125° F. In the highlands there is comparatively temperate climate, but the changes in temperature from day to day is often very marked; a change of more than 20° may occur within an hour.

The People; How They Live. While Ethiopia declares itself a Christian nation under the Coptic Church, the country contains as many Mohammedans as Christians, and multitudes profess no faith. This is not a negro country; the people are of the ancient Hamitic race; according to tradition, they sprang from Ham, son of Noah. There is an Arabic strain, handed down from the days of Arab domination.

This nation is almost entirely illiterate. No newspapers are supported; two or three cities have a few telephones, and there is a radio station at Addis Ababa. Such a thing as a regular mail service is unknown off the line of railroad. It is common for runners to carry letters and messages from village to village on cleft sticks (there are no pockets in native clothing); for personal reasons carriers may be assaulted, but their letters are never stolen.

In all the country there is but one railroad; it extends eastward from Addis Ababa to Djibouti, on the French Somali coast, has a length of 488 miles, and is French-owned. Usually not more than two round trips are made weekly. The natives are not road-builders, and they have never built bridges. Such bridges and roads as are in good condition are in the far north, constructed by the Italian army when it invaded the country. Trade is almost all by caravan, over well-trodden paths. There is an Addis Ababa bank that issues silver money, but in some sections natives prefer bars of salt as their medium of exchange; these they get from Eritrea, on the Red Sea coast, from natives who barter pepper for

them. Since the conquest, Italian currency circulates.

With few exceptions, all homes in Ethiopia, in city or country, are but crude huts of sticks and stones, with walls of mud and roofs of straw; some tin roofs are found in the towns. In Addis Ababa the city consists largely of many rude villages built around the palace of the late emperor.

Cities. Of first importance among the towns is Addis Ababa, the capital, located high on a tableland west of the center of the country. Its population is probably 65,000. Harrar (Harar), a strange walled city in the north-central section, is second in size, with about 40,000 people, but without rail connection. The third city is Diredawa (30,000), on the rail line from the capital. No other town contains more than 5,000 people; most important, in order, are Adowa, in the north; Askum, the holy city of Ethiopia, near Adowa; Dessaye, Magdala, Kaduna, and Sokoto.

Production. The people placidly engage in agriculture, each family raising enough for its needs, and a little over for town markets. The diversity of altitude permits a wide range of products of tropical and temperate climes. Agricultural implements are yet of the crudest sort. Cattle-raising is an important industry. Theoretically, before the Italian conquest, no native could own land, because for centuries it was held in the name of the emperors, who placed it at the disposal of provincial chieftains, and the natives paid a tax for the use of small acreages. What the future policy may be, the Italians have not disclosed. The rubber industry promises to become important, but lack of transportation retards its development. World petroleum interests believe there is petroleum in Ethiopia, but this has not been proved; a fifty-year oil lease to American companies was cancelled at the beginning of the Italian invasion in 1935 through international pressure. There are no manufactures of consequence; the people provide themselves with articles of home manufacture, but buy most of their cotton cloth from Europe.

The Late Government. Ethiopia had long been known as an absolute monarchy (see ABSOLUTISM). The last emperor, Haile Selassie, a graceful figure with a saintly face, was reputed to be the most learned monarch the country ever had; he became a master of

French and English, and was acquainted with world trends. He secured for Ethiopia membership in the League of Nations. Only in his title was there an indication of the half-savage character of the imperial throne. It was in full, "King of Kings of Ethiopia, Conquering Lion of the Tribe of Judah, Elect of God, and Light of the World," and was first assumed by Emperor Menelik (1844-1913), father of Zauditu, the succeeding monarch; she was the aunt whom Haile Selassie had served as regent before her death.

This last emperor was crowned amid barbaric splendor in 1930, at the age of thirty-nine. In the next year he granted the semblance of a Constitution, with very large powers reserved to the ruler, and he began cautiously to abolish slavery, which still had a foothold in the country. The Constitution provided for a legislative body of two houses, appointment to which was placed in the hands of provincial chieftains, subject to the emperor's approval.

History. Ethiopia is one of the oldest countries in the world, supposed to have been the Cush of the Old Testament. Its people believe it to have been the realm of the Queen of Sheba. This queen, called Balkis by the Arabs and Makeda by the Ethiopians, suffered from a crippled foot. She heard of the wisdom of Solomon and of a reputation for healing with which he was credited, and she visited him at Jeru-Salem (Jerusalem). Her stay was protracted, and Ethiopian tradition declares that a son was born to Solomon and Makeda, who was given the name Menelik. Solomon was said to have educated him in Jerusalem, finally sending him home to his mother's kingdom and entrusting him with the Ark of the Covenant, which is averred to be hidden to this day in Ethiopia, reputedly in or near the holy city of Askum.

This first Menelik succeeded his mother on the throne, and thus established a royal succession that remained unbroken. Authorities agree that in some respects this story lacks verification, but nevertheless, it is a part of Ethiopia's fervent beliefs.

Christianity was introduced into the country about A. D. 330. When the Arab invasion of North Africa occurred, the conquerors attempted to stamp it out, but were not completely successful. They left their mark upon the nation by changing its name to Abyss-

sinia, a name that before then had been applied only to a part of the country. The name Ethiopia became officially meaningless, and for more than a thousand years no attempt was made to revive it. While the country was cut off from free intercourse by the Arabs, it lapsed into partial barbarism.

In the fourteenth century the people began to regain some of their old influence, and for about two centuries wielded considerable power. The Arabs again overpowered them, and the emperor was forced into the mountains for safety. With the help of the Portuguese, the oppressors were finally vanquished, never to return, but until the nineteenth century the obscurity into which the nation had fallen continued.

In 1868 the ruler came to blows with the British because of depredations against English military outposts. With the defeat of the natives, the emperor committed suicide, and peace followed. The first modern ruler to achieve a place of note was Menelik II, a shrewd administrator and an able warrior. Early in his reign Italy tried to enlarge Eritrea by taking some of Menelik's territory, but at Adowa the trespassers were annihilated (1886).

The treaty of 1906 which guaranteed independence to the country has been noted above. Its terms were violated in 1935, when Italy accused Ethiopia of aggressions across boundary lines, for which proof could not be offered. Early in the year the Italians launched a campaign to conquer the country and make it an Italian colony. A large army, with the most modern machines of war, was assembled in Eritrea during the summer, awaiting the end of the rainy season to begin hostilities. The Ethiopian emperor by appeals to the League of Nations tried to avert the calamity of war; appeals to Italy by the League to submit its case to League decision were fruitless.

In October hostilities began, and the Ethiopian hordes gathered to the defense of their homeland. Minor successes were achieved by the invaders during the first few months, but there was by that time a realization of the task to which the Italians were committed. However, Italy steadily advanced, and the capital fell in April, 1936. Emperor Haile Selassie fled, and found refuge in England.

Soon after the war ended, the Italians divided their new territory into the provinces shown on the map accompanying this article.

ETHNOLOGY, *eth nol'o ji*, that branch of anthropology which treats of the origin and development of the human family and the races of men. Ethnography is the branch of ethnology that describes the races of men and traces their geographic distribution; it is concerned first with races as they are found today. Ethnography arose after the discovery of America and has been so faithfully cultivated that nearly every tribe of man has been accurately described by trained scientists.

Comparisons between different tribes and peoples and the contrasts between different periods of man's development yield numerous important conclusions. This work corresponds to the comparative anatomy and physiology of the bodies of men and animals.

Similar practices such as the initiation ceremonies for adolescent boys and girls, the magic performances used in hunting and agriculture, the production of toys and works of primitive art, are observed in many different regions of the earth. The ethnologist explains the origin and effects of such customs on social life.

Consult L. Farrand's *Basis of American History* for an elementary treatment of the subject. See also the articles ANTHROPOLOGY, SOCIOLOGY, and RACES OF MEN, in their alphabetical order in this work.

ETHYLENE, *eth'e leen*, also known to chemists as ethene, is a colorless gas having only a faint odor. It is a compound of carbon and hydrogen—in molecular composition two atoms of carbon and four of hydrogen (C_2H_4). In industry it has been in use for years mixed with common household gas to increase the latter's illuminating power. In 1923 two scientists of the University of Chicago (Luckhardt and Carter) discovered important uses of ethylene as an anesthetic in surgery and dentistry. Used as an anesthetic, it induces unconsciousness in a patient in a shorter time than is true of ether; under its influence there is normal respiration and completely relaxed muscles. Unlike ether, there are no distressing after-effects. When used as an anesthetic, ethylene is mixed with 8 to 12 per cent of oxygen; this union with oxygen gives it an explosive quality, against which the practitioner has learned to be watchful.

ETIOLATION, *et i o la'shun*. When a growing plant is put in a dark place it becomes pale and almost colorless; its growth

becomes lank and unhealthy. The change in color is caused by the absence of chlorophyll, the green coloring matter of plants, which cannot be produced without sunlight. The attenuated growth is due to the plant's eagerness to find light. This change in color and growth is known as etiolation.

ETNA, or **AETNA**, the greatest volcano in Europe, in Sicily, near the city of Catania. It rises immediately from the sea to an altitude of 10,755 feet, has a circumference of more than 100 miles and dominates the whole northeast part of Sicily. There are a number of towns on its lower slopes. The top is covered with perpetual snow; at the foot is a region of orchards, vineyards and olive groves; midway is the woody or forest region.

From the summit a splendid panorama is presented, embracing the whole of Sicily, the Lipari Islands, Malta and Calabria. The eruptions of Etna have been numerous, and many of them destructive. That of 1169 overwhelmed Catania and buried 15,000 persons in the ruins. In 1669 the lava spread over the country for forty days, and 10,000 persons are estimated to have perished. In 1693 there was an earthquake during the eruption, when over 60,000 lives were lost. Other eruptions occurred in 1865, 1879, 1886, and 1911. In the summer of 1923 it was violently active, sending forth fire and lava, followed by earthquakes and rendering 30,000 people homeless, destroying valuable farms and villages, but few lives were lost. See VOLCANO.

ETRUR'IA, a name given by the ancient Romans to that part of Italy bounded by the Apennines, the Tiber and the Mediterranean. The inhabitants, called Etruscans, came originally from Asia Minor, and, according to their own legends, they were settled in Italy and were in a flourishing condition by the middle of the eleventh century B. C. It is certain that at the foundation of Rome, Etruria was the most civilized portion of the Italian peninsula.

There were at one time three Etruscan confederacies, each composed of twelve city states. Each state had its own government. From the earliest times the Etruscans were engaged in constant warfare with Rome, which terminated in the complete subjugation of Etruria through a series of Roman victories, from the fall of Veii in 396 B. C. to the Battle of Vadimonian Lake, the latter in 283 B. C.

Etruscan art was in the main borrowed from Greece. Great quantities of relics have been found in the tombs, especially jewelry and painted vases (see below).

Etruscan Vases. Though made in Etruria, these vases were not products of Etruscan art, since they were really the productions of Greek workmen, the subjects, style and inscriptions being all Greek. A great number have been found in the tombs in Etruria, in Campania, and in Sicily. They are elegant in form and are enriched with bands of beautiful foliage and other ornaments and figures of a highly artistic character. One class has black figures and ornaments on a red ground, the natural color of the clay; another has the figures of the natural color and the ground painted black. During a later period of Etruscan art there was much variety in the form and ornamentation of these vases, gold and other colors being frequently made use of in their embellishment.

ETYMOLOGY, *et i mol'o ji*, the study of the origin and history of words. The most important text for the person who wishes to know something about etymology is an unabridged dictionary. The average person would hardly call a dictionary a fascinating book, but if studied in the right way it will prove to be full of interesting word histories. Words are not dead, stationary things; they develop and change with the passing of time, and sometimes come to have meanings quite different from those with which they started. The word *villain* is an instance. It is derived from the Latin *villa*, meaning *village*, and in the days of William the Conqueror it signified a common peasant or villager. In Bacon's time a villain was a clownish person, or boor; to-day the term is applied to one who is a scoundrel. Etymology is a subject of absorbing interest, as well as one of great educational value.

EUCALYPTUS, *u ka lip'tus*, a genus of trees, mostly natives of Australia, remarkable for their gigantic size, some of them attaining heights

between 480 and 500 feet. In the Australian colonies they are called gum trees, because gum exudes from their trunks. The wood is excellent for shipbuilding and similar purposes. The *blue gum*, famous for its rapid growth and ability to live through long periods of drought, is one of the best known species. This tree has become thoroughly naturalized in California, Florida and others of the Gulf states. The oil of eucalyptus is used medicinally, and a beverage is made from the sap of one species.

EUCHARIST, *u'ker ist*, a term applied in the Christian Church to the sacrament of the Lord's Supper. The word is derived from the Greek for *thankfulness*. Both Protestants and Greek and Roman Catholics observe this sacrament, the partakers of which are usually served bread and wine (or grape juice) about the altar or communion rail. In the Roman Catholic Church the observance is called the Blessed Sacrament. The observance of communion is obligatory upon Catholics during Pascal season, but weekly or even daily observance is common. Protestants do not as a rule have the ceremony oftener than once a month.

EUCHRE, *u'kur*, a game played by two, three or four persons, with a pack of cards from which all below seven or nine, as may have been agreed upon, have been rejected (See CARDS, PLAYING). Each player is dealt five cards, two together and then three together, after which the trump is turned. If the trump turned is a jack it counts one to the dealer. The one to the left of the dealer may order the dealer to take up the trump, or he may *pass*. He does the former if he thinks he has a hand strong enough to win three tricks, and the dealer, discarding one of his cards, takes up the trump. If he passes, the dealer's partner may order up the trump by saying "I assist," or he may *pass*, and so on, until the dealer's turn comes, when he takes up the card or turns it down, the latter meaning that he, too, passes. If the dealer passes, the first player to his left may make the trump what he likes. It is usually the suit of the same color. If the play passes around the second time and no one makes the trump, the deal passes to the left. It is a rule of the game that suit must be followed whenever possible.

The object is to win at least three tricks out of the five, and if the one who made the trump fails to win three, he is *euchred*, and



BLUE GUM

his opponent scores two. If he takes five tricks he scores two points. If he wins three or four tricks he scores one point. The cards rank as they do in whist, but in the trump suit the *right bower*, or jack of trumps, stands highest; the *left bower*, the other jack of the same color, is next, then ace, king, queen, and so on, in order, to the lowest. Sometimes in four-handed euchre it is permitted for one of the players to *play it alone*, in which case his partner lays down his cards and takes no part in the hand. If the player wins five tricks he counts four points; if three tricks, one point. If he fails to make three, the opponent scores two. A game of euchre consists either of five or ten points, unless another number is agreed upon. A three-handed game, in which two players combine against one, is known as *cut-throat euchre*.

EUCLID, *u'klid*, of Alexandria, a distinguished Greek mathematician who lived about 300 B. C. His *Elements of Geometry*, in thirteen books, are still extant, and the name Euclid is to-day synonymous with elementary geometry. The severity and accuracy of his methods of demonstration have as a whole never been surpassed. Besides the *Elements*, a few other works are attributed to Euclid.

EUGENE, *u jeen'*, ORÉ, the county seat of Lane County, about 125 miles south of Portland, on the Willamette River, the Southern Pacific Railroad and electric lines. The city is the seat of the state university, and it has also Northwestern Christian College. There is a city hall, a city library, a courthouse, a water system owned by the city, and an electric light plant. A Federal building is the location of the post office and of the Forest Service. There is an airport. It is the center of a fertile agricultural district. The manufactures include lumber (Douglas fir is plentiful), flour, foundry products, woolen goods, incubators and other products. Population, 1920, 10,593; in 1930, 18,901.

EUGENICS, *u jen'iks*, a science that studies ways and means of improving the quality of the human race. Its founder, Sir Francis Galton, selected the name *eugenics* as a proper one for the "science of being well born." The word is from the Greek for *good birth*. Advocates of the movement lay great stress on the advantage of being born of healthy parents, and they are working for more stringent marriage laws.

The laws of heredity declare that the qualities of every child come from his ancestors, near and remote; and experiments with the higher animals prove clearly what may be done if all but the most perfect individuals are eliminated. If, then, the state had the right and the power to prevent marriage and reproduction among all but those who are most fit, physically, mentally and morally, vast differences might be seen in the race within a few generations. But the most enthusiastic advocate of eugenics would deny the desirability of such a course, even were it practicable; for all agree that the science must be kept human, and that love and initiative on the part of those making marriages are factors which must be preserved.

One thing the state can do—prevent the marriage of the feeble-minded and the hereditary criminal classes; and this would in itself be a vast improvement. In earlier and less humanitarian times, those who were feeble in mind or in body tended to be crushed out in the struggle for existence; but the charity of the present day helps to keep such people alive, and at the same time does nothing to prevent their bringing into the world children who can be neither helpful nor happy. Such agencies, too, as war, which cause the death of many of the strongest men, necessarily result in a lower physical standard.

Looked at from any point of view, there are insuperable difficulties in the way of a strict enforcement of the principles of eugenics. Much can be done, and is being done, however, by the wide spread of the new doctrines among intelligent men and women. A few states of the Union have passed laws so strict as to call forth doubts as to their practicability; some require physical examination of couples contemplating marriage, the results determining permissibility.

EUGENIE-MARIE DE MONTIJO, *o sha ne' mah re' de mon tee'ho* (1826–1920), widow of Napoleon III. She was born at Granada, Spain, the daughter of Count de Montijo and a Scotch woman named Kirkpatrick. In 1853 she became the wife of Napoleon III and Empress of the French. Beautiful and clever, frivolous and pleasure-loving, she exerted a powerfully pernicious influence at court. She led the emperor into numerous political mistakes, notably the disastrous Mexican expedition of Maximilian and the Franco-Prussian War. When the war broke out with Germany (1870) she was appointed

regent during the Emperor's absence, but a revolution forced her to flee from France. She went to England, where she was joined by her son and later by the emperor. In 1873 Napoleon died, and six years later the prince imperial was slain while serving with the English army in Africa, in the Zulu War. After 1881 Eugenie lived chiefly at Farnborough, in Hampshire, England.

EUPHORBIA, *u for'be ah*. See SPURGE FAMILY.

EUPHRATES, *u fra'teez*, a celebrated river of Western Asia, in Iraq, having a double source in two streams which rise in Turkey. This river and the Tigris water one of the world's most historic areas, which in early Biblical times and later was the location of mighty empires where developed the ancient civilizations of Chaldea, Assyria, and Babylonia. Moreover, though nothing definite will ever be known, it is quite likely that not far from the point where the Tigris and the Euphrates meet and form one stream for the short distance onward to the Persian Gulf was located the first home of man, the idyllic Garden of Eden. Archaeologists assume that in all the known world no other spot than the pleasant alluvial plain between the two rivers was so favored by nature for the home of Adam and Eve. In the peninsula formed by the two rivers stood Baghdad of old, with its tales of Harum-el-Rashid, central figure in the glamorous tales of the *Arabian Nights*, and Baghdad is still there, an important city only a little more modern than it was centuries ago.

The total length of the Euphrates is 1,750 miles, and the area of its basin 260,000 square miles. It flows mainly in a southeasterly course through great alluvial plains till it falls into the Persian Gulf by several mouths, of which only one in Persian territory is navigable. About seventy miles from its mouth it is joined by the Tigris, where the united streams take the name of Shat-el-Arab. The Euphrates is navigable for about 1,100 miles.

EUREKA, *u re'kah*, CAL., the county seat of Humboldt County, about 275 miles north of San Francisco, on Humboldt Bay and on the Northwestern Pacific Railroad. There is ocean steamship connection with Pacific ports. The city has several miles of water frontage, lined with lumber yards, planing and shingle mills and other manufacturing establishments. It is a center of the redwood indus-

try. Large quantities of lumber, butter and other products are shipped from here, and there are also extensive tanneries and a large woolen mill. There is an airport owned by the county. The city has broad, well-paved streets, an ample water supply, electric light and power and gas plants, daily papers, banks, an opera house, hospitals, and theaters. A radio broadcasting station is in operation. Population, 1930, 15,752.

EUREKA SPRINGS, ARK., in the Ozark Mountains, one of the county seats of Carroll County (Berryville being the other), 150 miles northwest of Little Rock, near the Missouri boundary, on the Missouri & North Arkansas Railroad. The town is important for its forty or more mineral springs of medicinal properties. There is a Carnegie Library and a girls' school, in addition to hotels for the large number of guests who visit the springs. Onyx is found in the vicinity. Population, 1930, 2,276.

EURIPIDES, *u rip'i deez*, (about 480-406 B. C.), one of the three great tragic poets of Greece. He studied under Prodicus and Anaxagoras and is said to have begun to write at the age of eighteen, although his first play, the *Pleiades*, did not appear until some years later. In 441 B. C. he was successful in winning the first prize in dramatic competition and continued to compete for thirty-three years. Euripides is a master of tragic situations and pathos, and shows much knowledge of human nature and skill in grouping characters, but his works lack the artistic completeness and the sublime earnestness that characterize Aeschylus and Sophocles. As a representative of the new order which did not believe in the old gods of Greece, he had more interest in the thoughts and feelings of real men and women than in the experiences of legendary heroes. His characters, it is true, were drawn from mythology, but they were free-will beings, rather than puppets of the higher powers. Euripides is said to have composed seventy-five, or, according to another authority, ninety-two tragedies. Of these, eighteen are extant. The best-known are *Alcestis*, *Medea*, *Andromache*, *Electra*, *Iphigenia in Tauris*, *Orestes* and *Iphigenia in Aulis*.

EUROPA, in Greek mythology, the daughter of Agenor, king of the Phoenicians and the sister of Cadmus. The fable relates that she was carried off by Jupiter, who for the abduction had assumed the form of a bull.



EUROPE, for a thousand years and more the most important of the grand divisions, and the most powerful, though exceeded in size by all the continents except Australia. Asia and Africa cradled the world's oldest civilizations; in Asia were born all of the great religions, but Europeans or their descendants shaped modern civilization and created its standards of industry, education, music and art. In Europe the progressive branches of the white race struggled from savagery to an advanced stage of progress, and in this continent Christianity had its most important development—two outstanding facts in the history of civilization.

Location and Coast Line. The continent of Europe is really a great peninsula projecting from Asia, and the two are often spoken of as Eurasia. Europe extends from the Arctic Ocean on the north to Asia Minor, the Black Sea and the Mediterranean Sea on the south; its western border touches the Atlantic Ocean and the North Sea, and its eastern the Ural Mountains, the Ural River and the Caspian Sea. The most northerly point, North Cape, lies in the midst of polar ice; Cape Tarifa, in Spain, is the point farthest south.

The coast line is very irregular and extended, being longer, in proportion to area, than that of any other grand division. Its length is variously estimated at from 20,000 to 48,000 miles. This variation is due to the method of measurement, the shorter line including only the large indentations, while the longer includes all of the smaller ones.

The important coast waters are, on the north, the White Sea; on the east, the Caspian Sea; on the south, the Black Sea and Sea of Azov, the Bosphorus, Sea of Marmora, Dardanelles, Aegean Sea, Adriatic Sea, Gulf of Genoa, Gulf of Lyons and Strait of Gibraltar, and on the west, Bay of Biscay, English Channel, Strait of Dover, North Sea, Baltic Sea, Gulf of Bothnia and Gulf of Finland.

The continent contains a number of important projections. On the west there are the Scandinavian peninsula and Denmark; on the south, Spain, Italy and the Balkan peninsula, containing Greece and Albania. The surrounding islands of importance are, on the north, Nova Zembla and Kolguev; on the west, the Lofodens, Faroe, Shetland, Orkney, Hebrides and British Isles, near the coast, and Iceland in mid-ocean. The important islands of the Mediterranean are the Balearic Isles, Corsica, Sardinia, Sicily, Crete and the numerous smaller groups in the Ionian and Aegean seas. Most of these islands are out-croppings of the projected mountain ranges, and between them and the continent the sea is comparatively shallow.

Area and Population. With an area of 3,754,282 square miles, Europe is less than half as large as North America, and only about one-fourth larger than continental United States. Yet this comparatively small continent contains nearly forty nations, large and small, including principalities, each of which has an independent status. When the World War ended, several new nations appeared, as Austria-Hungary was broken up according to racial lines. Europe is more densely populated than any other continent, with an average density in normal times of 125 people to the square mile. Belgium and England are normally the most crowded countries in the world. The total population of Europe in 1933 was about 554,000,000, over three times that of all North America. Over 7,000,000 Europeans lost their lives in the World War.

Surface and Drainage. Fully two-thirds of the continent is low land, the larger part of which is a continuation of the great Asiatic plain, which is broken only by the Ural Mountains and has its western terminus in the lowlands of the British Isles. With the exception of the Kjölen Mountains, or Scandinavian Alps, forming the western boundary of the peninsula of the same name, the northern part of the continent is all low, and the plain extending westward includes the northern part of Germany, most of Belgium, the Netherlands and the northern and western part of France. The highlands consist of the main highland region in the south, having the Alps for its center, and numerous lower ranges to the north, the Ural Mountains in the extreme northeast, and the Kjölen in the northwest.







The southern highland district is by far the most important. This embraces the Alps and their neighboring ranges and attains its greatest height just north of the Italian peninsula, in Mont Blanc, Monte Rosa, Jungfrau and Matterhorn, with several other peaks, some of which exceed 15,000 feet in altitude. The greatest extent of these mountains is from east to west, and they have a length of nearly 700 miles. The plateau upon which they rest is crossed by minor ranges in various directions, and the southern spurs, namely, the Balkans, Apennines and Pyrenees with their projections, form the nucleus of the respective peninsulas occupied by Turkey and Greece, Italy, and Spain and Portugal. The Alps are divided by natural passes into three divisions, the western, central and eastern, and through these and other passes means of communication between the north and south have been maintained for centuries, while now in the neighborhood of three of them—Mount Cenis, Saint Gotthard and Simplon—railroad tunnels have pierced the mountains.

North and east of the Alps are the Carpathians, the Jura, the Harz and other minor ranges, with an altitude seldom exceeding 6,000 feet, but in a few cases reaching nearly 8,000. Between these mountains and the Alps are the great valleys of the Danube and the Upper Rhine, while on the south, between the main range of the Alps and the Apennines, is the valley of the Po, and to the west the Rhone descends to the Mediterranean between the Alps and the eastern extremity of the range connecting the Pyrenees. While the connection of the Pyrenees with the Alps is not evident geographically, geologists generally consider them to form a part of the same mountain system, and these with their western extension, the Cantabrians, form a practically impassable barrier between the Spanish peninsula and the countries to the north. South of these the Sierra Nevada and their branches give the peninsula its rugged and mountainous surface.

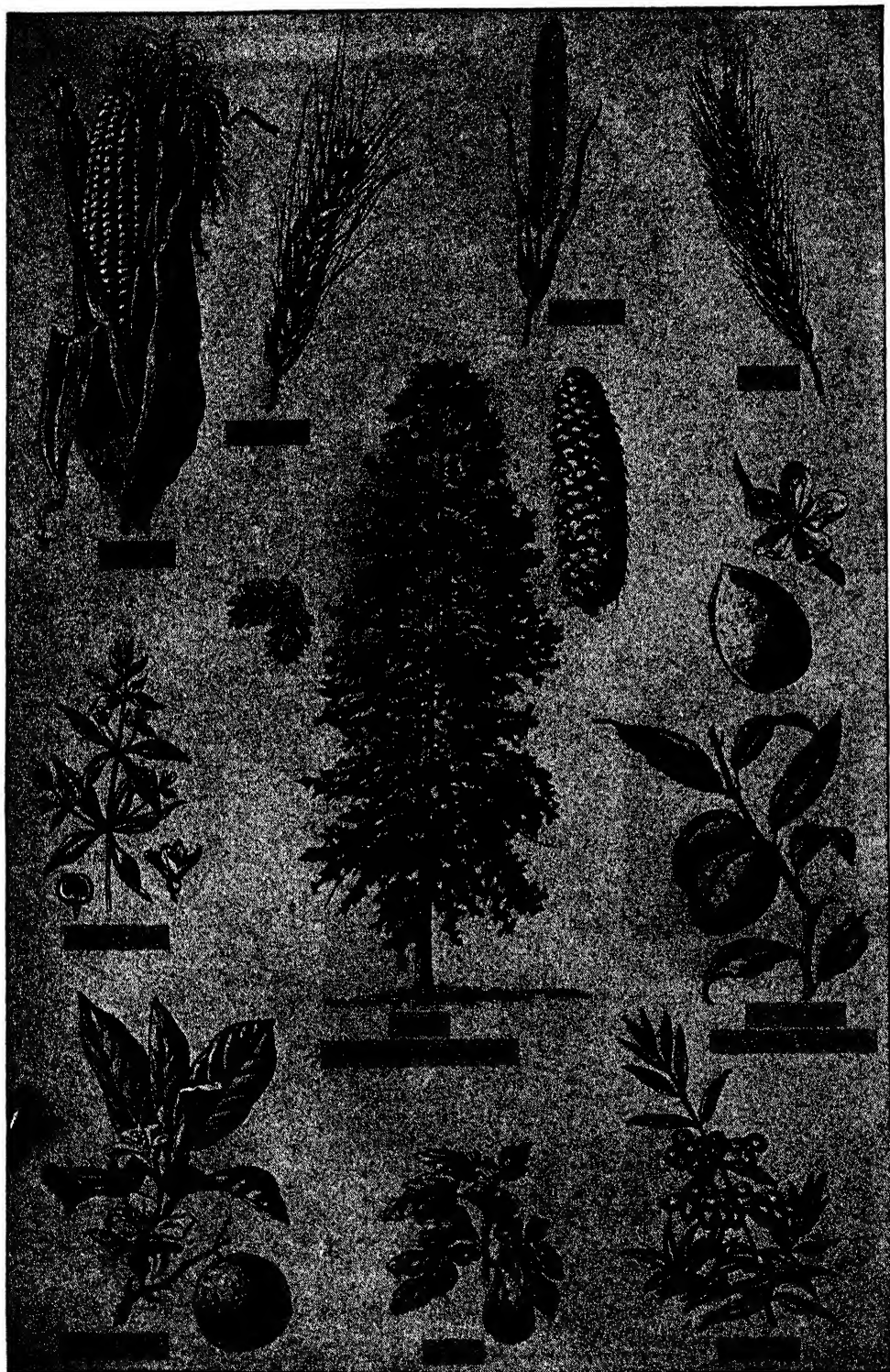
Rivers and Lakes. The main European watershed runs in a winding direction from southwest to northeast. At its northeastern extremity it is of very slight elevation. From the Alps descend some of the largest of the European rivers, the Rhine, the Rhone and the Po, while the Danube, a still greater stream, rises in the Black Forest north of the Alps. The Volga, which enters the Caspian

Sea, an inland sheet without outlet, is the longest of European rivers, having a direct length of nearly 1,700 miles, and, including windings, 2,400 miles. Into the Mediterranean flow the Ebro, the Rhone and the Po; into the Black Sea, the Danube, the Dnieper, the Dniester and the Don; into the Atlantic, the Guadalquivir, the Guadiana, the Tagus and the Loire; into the English Channel, the Seine; into the North Sea, the Rhine and the Elbe; into the Baltic, the Oder, the Vistula and the Duna; into the Arctic Ocean, the Dvina.

The lakes of Europe may be divided into two groups, the southern and the northern. The former run along both sides of the Alps, and among them, on the north side, are the lakes of Geneva, Neuchâtel, Thun, Lucerne, Zürich and Constance; on the south side, Lago Maggiore and the lakes of Como, Lugano, Iseo and Garda. The northern lakes extend across Sweden from west to east, and on the east side of the Baltic a number of lakes, stretching in the same direction across Finland on the borders of Russia, mark the continuation of the line of depression. It is in Russia that the largest European lakes are found—lakes Ladoga and Onega.

Mineral Resources. Europe possesses abundant stores of those minerals which are of the most importance to man. Coal and iron are found all through the central portion of the highland region, between the fortieth and sixtieth parallels of latitude, and are of sufficient abundance to be profitably worked in Norway, Sweden, Belgium, Germany, France and the British Isles. The Scandinavian peninsula also contains rich silver ore; valuable deposits of quicksilver are found in the Harz Mountains and in Spain, while in the Ural Mountains are stores of copper and platinum. Tin occurs in Great Britain and in Brittany. Italy abounds in marble of excellent quality, and nearly all of the mountainous countries contain extensive quarries of granite, limestone and other building material. Around the Black and Caspian seas are some of the world's richest deposits of petroleum.

Climate. Several circumstances concur to give Europe a climate peculiarly genial, such as its position almost wholly within the temperate zone and the great extent of its coast waters. Much benefit is derived also from the fact that its shores are exposed to the warm marine currents and warm winds





ANIMALS OF EUROPE
 Scandinavian Reindeer
 Mole

Ermine
 Brown Bear
 Russian Wolf

Beaver
 Owl
 Goat
 Alpine Ibex

from the southwest, which prevent the formation of ice on most of its northern shores. The eastern portion has a less favorable climate than the western. The extremes of temperature are greater, the summer being hotter and the winter colder, while the lines of equal mean temperature decline south as they go east. The same advantages of mild and genial temperature which Western Europe has over Eastern Europe, the continent as a whole has over the rest of the Old World. The diminution of mean temperature, as well as the intensity of the opposite seasons, increases as we go east. Peiping, in latitude 40° north, has as severe a winter as Leningrad, in latitude 60°. Throughout the continent there is sufficient rainfall for agriculture, and there are no desert areas.

Vegetation. With respect to the vegetable kingdom Europe may be divided into four zones. The first, or most northern, is that of fir and birch. The birch reaches almost to North Cape; the fir ceases a degree farther south. The cultivation of grain extends farther north than might be supposed. Barley ripens even under the 70th parallel of north latitude; wheat ceases at 64° in Norway, 62° in Sweden. Within this zone, the southern limit of which extends from latitude 64° in Norway to latitude 62° in Russia, agriculture has little importance, the inhabitants being chiefly occupied with the care of reindeer or cattle, and in fishing. The next zone, which may be called that of the oak and beech and cereal produce, extends from the limit above mentioned to the 48th parallel. The Alps, though beyond the limit, by reason of their elevation, belong to this zone, in the more moist parts of which cattle husbandry has been brought to perfection. Next is the zone of the chestnut and vine, occupying the space between the 48th parallel and the mountain chains of southern Europe. Here the oak still flourishes, but the pine species become rarer. Rye, which characterizes the preceding zone on the continent, gives way to wheat, and in the southern portion of it to maize, also. The fourth zone, comprehending the southern peninsulas, is that of the olive and evergreen woods. The orange flourishes in the southern portion and rice is cultivated in a few spots in Italy and Spain. See full page plate, *Plants of Europe*.

Animal Life. The reindeer and polar bears are peculiar to the north. Bears and wolves still inhabit the forests and mountains;

but, in general, cultivation and population have expelled wild animals. The domesticated animals are nearly the same throughout the continent. The ass and mule lose their size and beauty north of the Pyrenees and Alps. The Mediterranean Sea has many species of fish, but no great fishery; the northern seas, on the other hand, are annually filled with countless shoals of a few species, chiefly the herring, mackerel, cod and salmon. See full page plate, *Animals of Europe*.

Inhabitants. Europe is occupied by several different peoples or races, in many parts now greatly intermingled. The Celts once possessed the west of Europe from the Alps to the British Islands. But the Celtic nationalities were broken by the wave of Roman conquest, and the succeeding invasions of the Germanic tribes completed their political ruin. At the present day the Celtic language is spoken only in the Scotch Highlands (Gaelic), in some parts of Ireland (Irish), in Wales (Cymric) and in Brittany (Armorican). Next to the Celtic comes the Teutonic race, comprehending the Germanic and Scandinavian branches. The former includes the Germans, the Dutch and the English. The Scandinavians are divided into Danes, Swedes and Norwegians. To the east of the Teutonic race, though sometimes mixed with it, come the Slavonians, that is, the Russians, the Poles, the Czechs or Bohemians, the Servians, Croatsians and a few others of lesser importance.

In the south and southeast of Europe are the Greek and Latin peoples, the latter comprising the Italians, French, Spanish and Portuguese. All the above peoples are regarded as belonging to the Indo-European, or Aryan, stock. To the Mongolian stock belong the Turks, Finns, Lapps and Magyars, or Hungarians, all immigrants into Europe in comparatively recent times. The Basques, at the western extremity of the Pyrenees, are a people whose affinities have not been determined. The prevailing religion is the Christian, embracing the Roman Catholic Church, which has the most communicants, the various sects of Protestants—Lutheran, Calvinistic, Anglican, Baptists, Methodists—and the Greek Church. A part of the inhabitants profess the Jewish, a part the Mohammedan, religion.

History. The name Europe is a corruption of the Assyrian word *Ereb*, which means *land of the setting sun*. The ancient inhabitants



DAVID Michelangelo



VICTORY OF SAMOTHRACE



JULIUS CAESAR



VENUS OF MILO



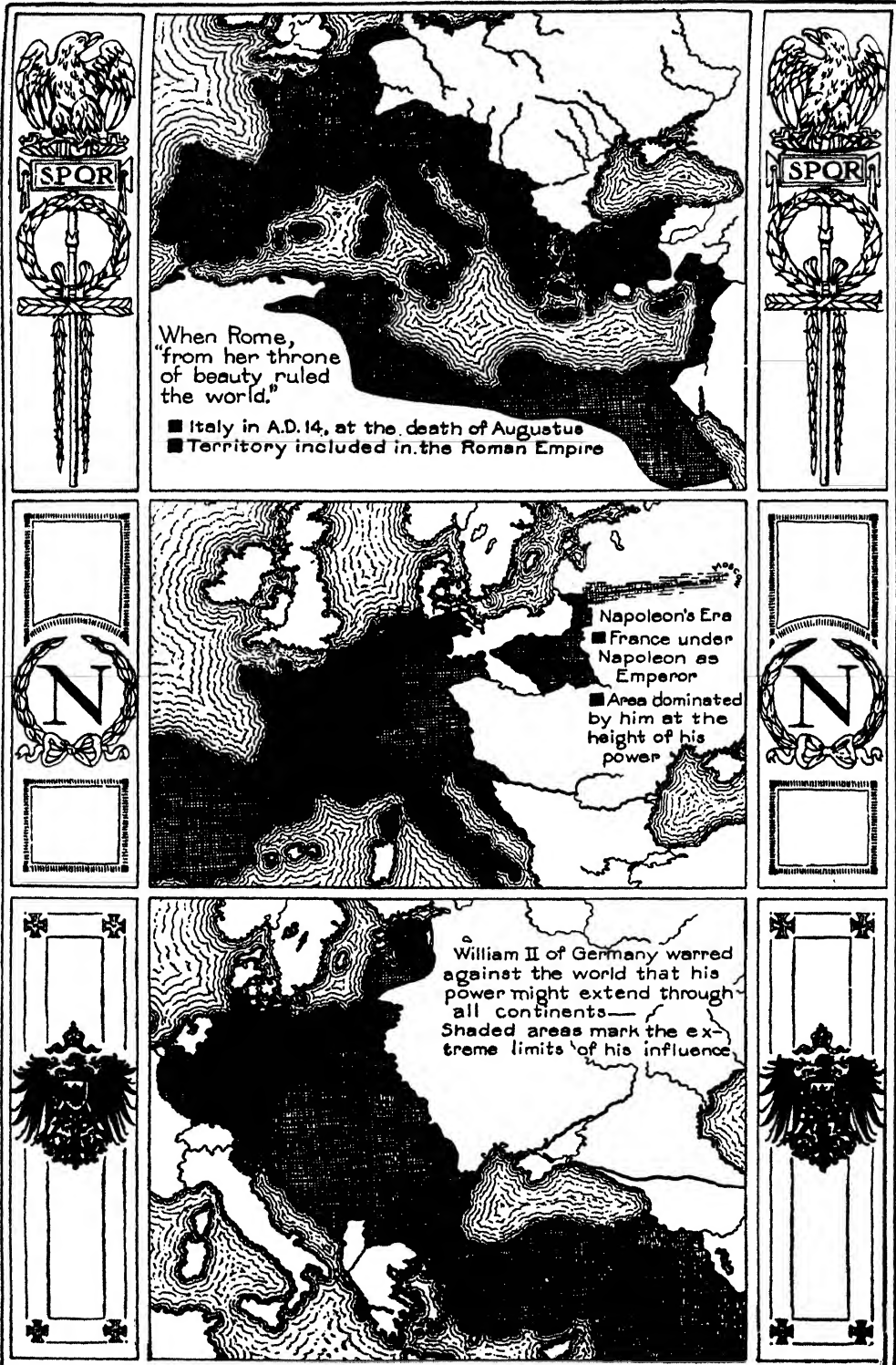
LAST DAY OF NAPOLEON Vela



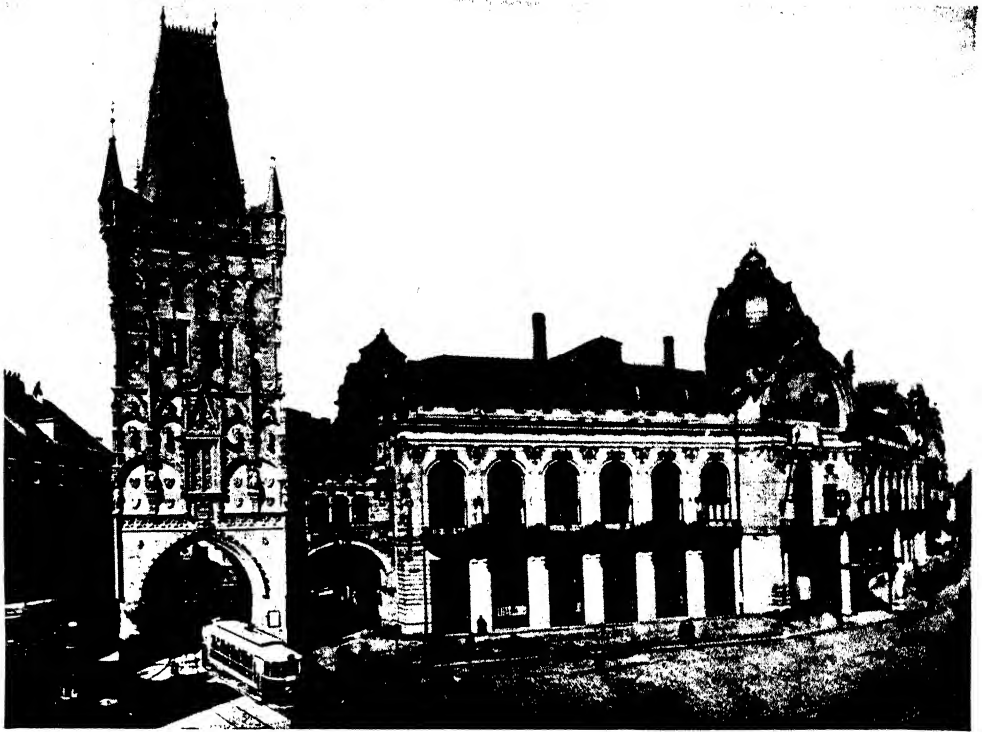
DISCOBOLUS OF NAUCRIDES



DETAIL FROM THE FRIEZE OF THE PARTHENON



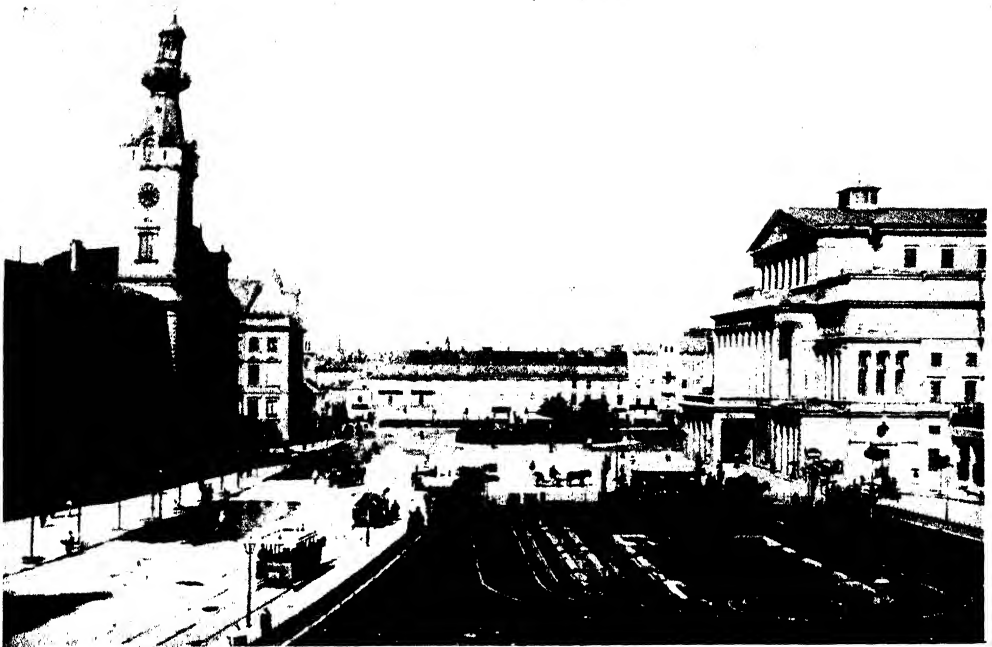
THREE GREAT ATTEMPTS TO GAIN WORLD POWER
1276



Underwood & Underwood

VIEWS IN EUROPEAN CITIES

Above: Prague, Czechoslovakia; the Powder Tower and House of Parliament.
 Below: Basel, Switzerland; stone arched bridge over the River Rhine.



Pacific & Atlantic



Ewing Galloway

VIEWS IN EUROPEAN CAPITALS

Above: Warsaw, Poland; ancient and modern architecture, side by side, in the public square.

Below: Lisbon, Portugal; a beautiful open square with mosaic pavement. The statue is of Peter IV.

of Asia Minor so named it, calling their own country *Assu land*, of the rising sun. The first authentic history of Europe begins in Greece at about 776 B. C. Greek civilization was at its most flourishing period about 430 B. C. After Greece came Rome, which, by the early part of the Christian Era, had conquered Spain, Greece, Gaul, Helvetia, Germany between the Danube and the Alps, Illyria, Dacia and a few other regions. Improved laws and superior arts of life spread with the Roman Empire throughout Europe, and the unity of government was also extremely favorable to the extension of Christianity. With the decline of the Roman Empire a great change in the political constitution of Europe was produced by the universal migration of the northern nations. The Ostrogoths and Lombards settled in Italy, the Franks in France, the Visigoths in Spain and the Anglo-Saxons in South Britain, reducing the inhabitants to subjection or becoming incorporated with them.

Under Charlemagne (771-814) a great Germanic empire was established, so extensive that the kingdoms of France, Germany, Italy, Burgundy, Lorraine and Navarre were afterward formed out of it. About this time the northern and eastern nations of Europe began to exert an influence in the affairs of the continent. The Slavs, or Slavonians, founded kingdoms in Bohemia, Poland, Russia and the north of Germany; the Magyars appeared in Hungary, and the Normans agitated all Europe, founding kingdoms and principalities in England, France, Sicily and the East. The Crusades and the growth of the Ottoman power are among the principal events which influenced Europe from the twelfth to the fifteenth century. The conquest of Constantinople by the Turks (1453), by driving the learned Greeks from this city, gave a new impulse to letters in Western Europe, which was carried onward by the Reformation and the invention of printing.

The discovery of America was followed by the temporary preponderance of Spain, then of France, in Europe. Subsequently, Prussia and Russia gradually increased in territory and strength. The French Revolution (1789) and the Napoleonic wars had a profound effect on Europe, the dissolution of the old German Empire being one of the results. Since then the most important events in European history have been the establishment of the independence of Greece; the disap-

pearance, then the revival, of Poland; the unification of Italy under Victor Emmanuel; the Franco-German War, resulting in the consolidation of Germany into an empire under the leadership of Prussia; the partial dismemberment of the Turkish Empire and the war between Turkey and Greece (1897); the Spanish-American War, (1898), which deprived Spain of its chief colonies; the Anglo-Boer War (1899), which strengthened Great Britain's hold upon Southern Africa; the Russo-Japanese War (1904), which deprived Russia of its supremacy in the Far East; the Turko-Italian War (1911-1912), by which Italy gained possession of Tripoli; the Turko-Balkan War (1913), which left Turkey no territory in Europe except Constantinople and surrounding territory; and the World War, which involved all of the Great Powers and caused an unprecedented loss of life and property. The details of that struggle and its effect on the different nations will be found under the heading WORLD WAR. See also the subhead *History*, in the articles on the various countries.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Adriatic Sea	Maggiore, Lake
Aegean Sea	Main
Alps	Marmora, Sea of
Apennines	Marne
Arctic Ocean	Matterhorn
Arno	Mediterranean Sea
Atlantic Ocean	Meuse
Avernus	Mont Blanc
Azov, Sea of	Moselle
Balkan Mountains	Neuchâtel, Lake of
Baltic Sea	Neva
Biscay, Bay of	North Sea
Black Forest	Olympus
Black Sea	Parnassus
Bosporus	Pyrenees
Bothnia, Gulf of	Oder
Carpathian Mountains	Po
Caspian Sea	Rhine
Cattegat	Rhone
Caucasus	Riga, Gulf of
Cenis, Mont	Rosa, Monte
Cevennes	Rubicon
Constance, Lake	Saint Gotthard
Danube	Saone
Dardanelles	Scheldt
Dnieper	Seine
Dniester	Sierra Nevada
Don	Somme
Elbe	Skagerrak
English Channel	Tiber
Garonne River	Ural Mountains
Geneva, Lake	Valdai Hills
Gibraltar	Vosges Mountains
Harz	White Sea
Jungfrau	Zurich, Lake
Jura	Vistula
Loire	Volga
Lucerne, Lake of	

POLITICAL DIVISIONS

Albania	Czechoslovakia
Alsace-Lorraine	Denmark
Andorra	England
Austria	Finland
Belgium	France
Bulgaria	Germany
Courland	

Great Britain
Greece
Hungary
Ireland
Italy
Jugo-Slavia
Lapland
Liechtenstein
Lithuania
Livonia
Luxembourg
Monaco
Montenegro
Netherlands, The
Norway

Poland
Portugal
Prussia
Rumania
Rumelia
Russia
San Marino
Scotland
Serbia
Spain
Sweden
Switzerland
Turkey
Ukraine, The
Wales

HISTORY

Balance of Power	Napoleon I
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Bolshevik	Printing
Charlemagne	Reformation
Chivalry	Renaissance
Crusades	Roman Catholic Church
Eastern Question	Seven Years' War
Feudal System	Succession Wars
Franco-German War	Thirty Years' War
French Revolution	Triple Alliance
Holy Roman Empire	Triple Entente
Hundred Years' War	World War

EURYDICE, *u rid'i see*, in Greek mythology, the wife of Orpheus. She died from the bite of a serpent, and Orpheus descended into Hades and gained her release by the power of his lyre. But Pluto agreed to her leaving only on condition that Orpheus precede her and refrain from glancing back. Orpheus consented, but, overcome with a desire to look upon his wife, turned, and Eurydice was drawn back into the region of the dead. The story has been a favorite theme for artists both Greek and modern.

EUSTACHIAN, *us ta'k'ian*, **TUBES**, a pair of tubes belonging to the apparatus of the ear. They are so called from their discoverer. In man these tubes are about an inch and a half long, and have walls of cartilage, bone and fibrous tissue. They proceed from the inner side of the cavity of the middle ear (see illustration, accompanying EAR) and open into the pharynx. Through them air enters the cavity from the throat, and this aids in keeping equal the atmospheric pressure on each side of the drum membrane. When through any cause the Eustachian tubes become inflamed they are unable to transmit air to the cavity of the middle ear, and this condition produces head noises and partial or total deafness.

Bartolommeo Eustachio, *a oos tah'ke*, (1574), an Italian surgeon, whose discoveries in anatomy made him famous. To him anatomists are indebted, among other things, for the first accurate knowledge of the internal ear and its structure, of the development of the teeth and of the structure of the kidneys.

EUTAW SPRINGS, BATTLE OF, an important battle of the American Revolution

fought September 8, 1781, about sixty miles northwest of Charleston, S. C., between an American force of 2,000 under General Greene and about an equal British force under General Stuart. The battle began about four o'clock in the morning with an engagement in which the Americans were victorious. Late in the day the British rallied and held their ground, but after the fight they retreated toward Charleston. This battle closed Greene's famous campaign in the South, by which he compelled the enemy to retire to Charleston, there to remain during the rest of the struggle.

EUTERPE, *u tur'pe*, in classical mythology, the Muse who presided over lyric poetry. The invention of the flute was ascribed to her, and she was usually represented as a virgin crowned with flowers, holding a flute in her hand.

EVANGELICAL, *e van jel'i kal*, **ALLIANCE**, an international association of Baptists, Methodists, Episcopalians, Lutherans, Presbyterians, Moravians, Independents and some others, organized in London in 1846. It was intended to bring the Christian churches closer together in work in which all Christian people are generally interested. The countries it represents are England, France, Germany, Ireland, Scotland, Switzerland and the United States. Branches are found in many of the British colonies. The American branch was organized in 1867. International conferences are held at intervals of from two to four years. The organization has done much to promote religious liberty and to break down denominational barriers in every country to which its influence has extended.

EVANGELICAL CHURCH, a union brought about in 1922 of two religious organizations, the Evangelical Association and the United Evangelical Church. These previously had been one body, but had separated in 1891 over differences that could not be reconciled. The Association had been formed by Pennsylvania Germans, under the leadership of Jacob Allbright, and its first general conference was held in 1816. The seceding faction formed the United Evangelical Church, and the two continued apart for more than thirty years. In 1934 another change occurred when the reunited Evangelical Church joined with the Reformed Church under a new name, the Reformed and Evangelical Church.

EVANGELINE, *evan'jel in*, a narrative poem in blank verse, written by Longfellow, and based on the expulsion of the Acadian peasants from what is now Nova Scotia, in 1755 (see *ACADIA*). It tells the history of two lovers, Gabriel and Evangeline, who were separated at the time the ships sailed away. For many years Evangeline wandered through cities and woodlands, searching for her lover, and she found him only on his deathbed. The following Lines indicate the theme of the poem:

Ye who believe in affection that hopes, and is patient,

Ye who believe in the beauty and strength of woman's devotion,

List to the mournful tradition still sung by the pines of the forest;

List to a tale in Acadie, home of the happy.

Evangeline was published in 1847, and was the author's first long narrative in verse. Longfellow was indebted to Hawthorne for the facts of the story. The meter used is dactylic hexameter, which is the form used in the *Iliad* and the *Aeneid*. The poem has been widely read, and is greatly admired for the stately beauty of its lines and the lofty sentiments it expresses.

EVANS, MARY ANN, or MARIAN. See ELIOT, GEORGE.

EVANS, ROBLEY DUNGLISON (1846-1912), an American naval officer, affectionately called "Fighting Bob," was born in Virginia and educated at the United States Naval Academy at Annapolis. During the Civil War he was present at both attacks on Fort Fisher, and in the second he was wounded. Returning to the service in 1866, he occupied various positions until 1896, when he was put in command of the *Indiana*. During the Spanish-American War he commanded the *Iowa* and took a prominent part in the capture of the Spanish fleet off Santiago. In 1901 he was made rear admiral. In 1907 he commanded the American fleet in its tour around the world until it reached the Pacific coast of California, when he was relieved, having reached the age for retirement from active duty.

EVANSTON, ILL., in Cook County, on Lake Michigan, just north of the limits of Chicago and twelve miles from the center of the city. It is on the Chicago & Northwestern Railroad, and it also has electric railway connection with Chicago and the many towns to the north along the lake shore, including Kenosha, Racine and Milwaukee. The city is

beautifully situated and is exclusively a residence suburb of Chicago. It is the seat of Northwestern University (which see), Garrett Biblical Institute, the Evanston Bible School, the National College of Education, the Seabury-Western Theological Seminary and Marywood School. The city is therefore one of the leading educational centers of the United States. Evanston was settled about 1835 and was incorporated in 1890. Population, 1930, 63,338.

EVANSVILLE, IND., the county seat of Vanderburg County, on the Ohio River, 180 miles southwest of Indianapolis, on the Chicago & Eastern Illinois, the Cleveland, Cincinnati, Chicago & Saint Louis, the Illinois Central, the Louisville & Nashville and the Southern railways, and on one interurban line. The airport is five miles distant; the aerological observatory is under the jurisdiction of the United States Weather Bureau.

The prominent institutions and buildings are the Coliseum, the seven public libraries, Evansville College with over 1,000 students, the Evansville Zoo, two music schools, a museum, 35 school buildings, 113 churches and six hospitals.

The city's industries number 230 and produce automobile bodies and tops, beds, boilers, castings, cosmetics, optical goods, farm machinery, textiles and tools. The city was chartered in 1847 and reincorporated in 1905. Population, 1930, 102,249.

EVAPORATION, *evapo'ra'shun*, the change from a liquid or solid to a gaseous state. Wet clothes hung in a warm, dry yard soon become dry. Their moisture evaporates, or changes to vapor. A block of ice exposed to air, even in freezing temperature, also evaporates. Rivers, lakes and oceans in the same way lose their moisture, which changes to vapor and becomes a part of the atmosphere. By means of evaporation the earth's moisture, necessary for plant and animal life, is constantly being redistributed. Unless vaporization were constantly going on the earth would soon be a desert; most of the animal life would disappear, for without moisture the air would be unfit to breathe. Evaporation usually takes place rapidly at high temperatures; however, the amount of moisture already in the air determines the rate of evaporation. If wet clothes are continuously hung in a room without good ventilation the air will in time become so moist that it will take no more water; it is then

said to be *saturated*. Saturation in the upper strata of the atmosphere results in rain. Wetness of air is called humidity.

EVARTS, WILLIAM MAXWELL (1818-1901), an American lawyer and statesman, born in Boston. He was graduated from Yale in 1837 and studied law at Harvard College. He was admitted to the bar in New York City in 1841, and rapidly rose in his profession. Evarts was at one time assistant district-attorney in New York City, was President Johnson's counsel in his impeachment trial, and was leading counsel for the United States in the Alabama Claims controversy. In the Hayes-Tilden contest he managed the case for Hayes before the Commission and was made by him Secretary of State. Evarts was elected to the United States Senate in 1885 and served until 1891, when he retired to private life.

EVENING SCHOOLS are maintained in cities in various parts of Europe and America. The European evening schools were probably the outgrowth of Sunday schools which, about the middle of the eighteenth century, added to their religious teaching instruction in the common branches. In most European countries at that time education was not compulsory, and these night schools enabled many children to obtain an education of which they would otherwise have been deprived. Night schools are now maintained in Germany, Switzerland and Great Britain at the expense of the state and are open to pupils of both sexes.

The evening schools in the United States began about 1850, and they now form a part of the educational system of nearly all large cities. Their sessions usually continue from November to March. Pupils are admitted without regard to age, nationality or previous education. The methods of instruction and subjects taught often differ widely from those in the day schools. Many pupils are foreigners and attend for the purpose of learning English. Newspapers are often used in the place of text-books, and in the best schools the greatest freedom is maintained between teachers and pupils.

The purpose is to adapt the teaching to the needs of the individual pupil and to enable him, during the time that he can attend the school, to obtain the greatest possible benefit. Arithmetic, writing, English, other common branches and commercial branches are taught. In large cities special institu-

tions, such as the Drexel Institute in Philadelphia and Cooper Union in New York, maintain evening classes, in which instruction of a high order is given. The Young Men's Christian Association also maintains evening schools in most of the large cities. See **ADULT EDUCATION**.

EVENING STAR, or **HESPERUS**, the first star to appear in the western sky after sunset. When Venus is east of the sun it appears in the west as the first star of evening. When west of the sun, it appears as the last star of morning and then Mars, Jupiter and Saturn in turn appear as the evening star.

EVEREST, MOUNT, the highest peak in the world. It is in the Himalaya range, on the southern frontier of Tibet, near the north-western boundary of Nepal. It is approximately five and a half miles above sea-level, exactly 29,141 feet. Its height was estimated in 1841 by Sir George Everest, who was surveyor-general of Canada; in his honor it was named.

EVERETT, EDWARD (1794-1865), an American statesman, born at Dorchester, Mass., educated at Harvard College. He entered the Unitarian ministry, but resigned in 1815 and traveled in Germany and England, returning in 1819 to occupy the chair of Greek literature at Harvard. He became editor of the *North American Review* and, entering politics, became successively member of Congress, governor of Massachusetts and minister plenipotentiary to England. In 1845 he was appointed president of Harvard College and in 1852 became Secretary of State. He was then elected United States Senator as a conservative Whig, but resigned in 1854. In 1860 Everett was nominated for Vice-President by the Constitutional Union party. Shortly after, he retired to private life.

Everett was considered one of the greatest American orators. He delivered the principal address at Gettysburg, just preceding the brief address of Abraham Lincoln. Everett prophesied that the Lincoln address would live forever, while his own studied effort would quickly be forgotten.

EVERETT, WASH., the county seat of Snohomish County, thirty-three miles north of Seattle, on Puget Sound and on the Northern Pacific, the Great Northern and a branch of the Chicago, Milwaukee & Puget Sound railroads. The city has an excellent harbor and a good coasting trade, and is in a pro-

ductive agricultural, lumbering and mining region; copper, gold and silver are found. There are shipyards, iron works, paper mills, a smelter, and some of the greatest lumber mills in the northwest. The town was settled in 1891, was incorporated two years later and has experienced a rapid growth on account of its natural advantages. Population, 1930, 30,567.

EVERGLADES, *ev' er glaydz*, any low, swampy region, but particularly the name of a vast area in Southern Florida, 110 miles long and about forty-five miles wide. For a long time white men made no attempt to occupy the Everglades although they have been the home of the Florida Seminoles for generations. Animal life normally is very abundant, but alligators, crocodiles and some species of birds are rapidly disappearing.

For several years the Federal government has been coöperating with the state of Florida in reclaiming the Everglades. Canals have been constructed through the almost sea-level swamps eastward to the ocean, and already more than 3,000,00 acres of rich lands have been made available for tropical agriculture. The entire Everglades area covers about 5,000 square miles. While not long ago almost inaccessible, today fine motor roads traverse the region.

EVERGREEN, any tree or plant which stays green all the year. Most trees drop their leaves at least once a year, usually in the fall, and remain bare for months. Such are called deciduous trees (which see). An evergreen tree does not throw off its old dress until it has a new one; the new leaves push the old ones off. Evergreen leaves are tough and can stand a very low degree of temperature. In the case of cone-bearing evergreens, such as pines, the foliage has the form of needles. In warm climates some evergreens retain their leaves several years. Holly, ivy, boxwood and myrtle are the principal small evergreens of the North American continent.

EVERLASTING FLOWER, a name applied to several kinds of blossoms which do not fade. They are sometimes called *immortelles*. After the flowers open they dry out and become crisp without losing their form or color. The common *immortelle* is a button-shaped blossom in form not unlike a rose, but with tiny petals. The flowers never wither, but in time become so dry and crisp they fall to pieces.

EVOLUTION, *ev o lu'shun*, a term derived from the Latin for *unrolling*, and applied to the modern theory of the development of life forms. Evolutionists do not believe that the trees and flowers are what they were ages ago, or that human creatures began as highly-civilized beings. Evolution teaches that there has been an unfolding or unrolling process from the earliest eras, and that all present forms of plant and animal life are the result of an orderly development according to natural law. This theory has received particularly strong support through advanced studies in geology. By examining the rock layers underlying the earth's surface, scientists have been able to read the earth's story from the present back to the first stages of life. Each layer of rock representing a past geological age, contains fossils of plant and animal life, and the complete series shows that the most complex organisms may all be traced to the simplest life form, the cell of protoplasm.

The most fascinating subject connected with this theory is the descent of man. Darwin, the father of the evolutionary theory, declared that man and the manlike apes are the offspring of a common ancestor, each group representing a branch of a single tree. Primitive man was not greatly different from the apes, but he had within him certain possibilities that the apes did not possess, the something that sets apart the human being from the brute. At one time many believers in Christianity could not reconcile the theory of evolution with the doctrines of the New Testament, but religious thinkers are coming more and more to accept it. They assert that the theory is correct in so far as it goes, but that there is a great controlling power which works through all things, and that evolution is the orderly working out of divine laws. See DARWIN, CHARLES.

EVOLUTION, in mathematics. See Root; ARITHMETIC.

EXCALIBUR, *eks kal'i bur*, in the legends of King Arthur, a miraculous sword which the king received from the hand of the Lady of the Lake. When he was about to die, after the "last, dim, weird battle of the west," Arthur commanded Sir Bedivere to fling the sword into the lake, an order obeyed by the knight after repeated commands. In the *Passing of Arthur*, one of Tennyson's *Idylls of the King*, the sword and its fate are described.

EXCAVATIONS IN ANCIENT LANDS.

The peoples who inhabit the earth are constantly changing in their characteristics and modes of life. The earliest of them could not write, and these left not a word telling how they had lived. Later peoples wrote about themselves by engraving on the walls of buildings, caves and tombs, and on bricks and tablets of stone. In time all these peoples passed away from the face of the earth. Floods washed over their buildings and, subsiding, deposited upon them tons of debris; earthquakes razed walls and the wind drew over them a blanket of sand; volcanoes covered cities with lava and ashes. Not only the people themselves but all that pertained to them lay buried in great earthly sepulchres. Then other peoples flourished where these had lived, and they, too, passed away. A little of the history of ancient peoples has come down to us through successive generations, but this is comparatively slight. The written history that has come to us has not only been supplemented, but corroborated, by the extensive excavations in ancient lands made in the last hundred fifty years.

In the middle of the eighteenth century excavations made in Greece resulted in the unearthing of statuary and temples belonging to the fourth and fifth centuries B. C. In 1869 some excavators working in Asia Minor discovered the site of ancient Troy; others digging at Mycenae and Tiryns found remains of a very ancient Greek civilization known as the Mycenaean, which flourished between 1500 and 1100 B. C. Relics found on the Island of Crete point to a much older civilization, the Aegean, which probably flourished about 4000 B. C., while other remains found buried still deeper tell of a people who lived six thousand years earlier. Hoary indeed is this buried history, and yet it is not the oldest of which there is unwritten record, for discoveries of certain prehistoric remains in Germany, France, Spain and England have led archeologists to believe that a race of men inhabited Europe 100,000 years ago.

Among the most interesting relics disclosed by excavations have been those brought to light at Herculaneum and Pompeii (see these titles), the two cities buried by eruption of Vesuvius in the first century of the Christian Era. So complete was the preservation of these cities that scientists have been able to present a very good picture of the

life that once flowed through them, and, by analogy, the contemporary life of other Italian cities. Excavations among the tombs of Egypt, and also in Assyria, Babylonia and Palestine, have uncovered material from which the lives and customs of the ancient people is learned. In Mesopotamia were found implements and inscriptions throwing light on Nebuchadnezzar and his people. The tomb of Tut-Ankh-Amen excavated in 1922-23 has brought to light material of most wonderful artistic and historical value.

In America excavations have brought to light valuable data concerning the life of the Aztecs, Mayans and Mound Builders. See *ARCHAEOLOGY*, for fuller details.

EXCHANGE, in commerce, that species of transactions by which the debts of individuals residing at a distance are canceled by written order, called a bill of exchange, or draft, without the transmission of specie. Thus, a merchant in Chicago who owes \$500 for goods bought in New York, gives a bill, or order, for that amount, which can be offset through banking agencies, or otherwise, against similar debts owing by parties in New York to persons in Chicago. The creditor of Chicago is thus paid by the New York debtor and *vice versa*, and the expense and risk of transmitting money is thus obviated.

The process of liquidating obligations between different nations is carried on in the same way, by an exchange of foreign bills. Exchange is said to be *at par* when a bill drawn in New York for the payment of £100 sterling in London can be purchased there for £100. If it can be purchased for less, exchange is said to be *under* or *below par* and is against London. If the purchaser is obliged to give more, exchange is *above par* and is in favor of London. Although the thousand circumstances which incessantly affect the value of money prevent the ordinary course of exchange from ever being precisely at par, its fluctuations are confined within narrow limits.

EXCHEQUER, CHANCELLOR OF THE, in Great Britain the head of the Treasury Department. As the House of Commons holds the purse strings of England, the Chancellor must be a member of that body. The office may be held by the Prime Minister if he is a member of the lower house.

EXCHEQUER, *ex chek' er*, **COURT OF CANADA**. The exchequer court originally formed part of the Supreme Court, but in

1887 the two courts were separated. The name "exchequer court" carries us back to early English times. The king's treasury was in charge of a treasurer or "hoarder;" as the revenues increased in amount and as disputes arose in connection with their management, it became necessary to divide the duties into an administrative and a judicial department. When the English courts were formed, questions affecting the revenue were referred to the court called the *exchequer*, which derived its name, so we are told, from a chequered cloth which covered the table. The duties of the court grew in importance and were gradually extended to all suits in which the Crown was interested.

The exchequer court of the Dominion is presided over by one judge and has original jurisdiction in "all claims, suits or actions against the Crown." It also has jurisdiction in revenue cases and the enforcement of penalties, copyright, trade mark, and patent cases, and hears claims against the government when any person suffers injuries from or in the construction or operation of a public work. It hears all actions in which the Crown takes part in cases of receiver for or sale of insolvent railways, and in time of war it is also a prize court.

EXCISE, *ek'size*, **TAX**, any duty or tax levied upon goods, but a term particularly employed with respect to a tax upon goods manufactured, sold and consumed within a country, as opposed to a tax upon imports. See INTERNAL REVENUE SYSTEM.

EXECUTIVE COUNCIL, IN CANADA.

The Executive Council is the name given to the body of men composing the administration of each province. The number and titles of ministers varies; broadly speaking, they correspond to the departments of the Dominion government. Each province has an attorney-general, who supervises the administration of justice and is the legal adviser of the government. Nova Scotia, whose agricultural interests are small, has no minister of agriculture, whereas Saskatchewan, whose mining interests are as yet not developed, needs no minister of mines. There is generally a treasurer or minister of finance, and there are officials at the head of the different departments of public works, crown lands, education, etc. All the members of the council who are departmental officers must vacate their seats if the assembly votes against them. All the conventions, furthermore, which gov-

ern the relations of the Governor-General and his ministers apply with equal force to the relations between a lieutenant-governor and his councillors.

EXECUTIVE DEPARTMENT, that branch of the government of a country by which the laws are carried into effect or by which the enforcement of them is superintended. The term is used in distinction from the *legislative* department, which makes the laws, and the *judicial* department, which interprets them (declaring the extent of their aim and their constitutionality). It includes the supreme magistrate, whether emperor, king, president or governor, his cabinet, or ministers, and a host of minor officials.

EXECUTOR, in law, one appointed by a person's last will to carry its provisions into execution after the testator's death. The testator may, by the common law, appoint any person of sound mind and discretion, except one disqualified by legal restrictions such as those affecting married women and minors. If no executor has been named by the testator, an administrator is appointed by the judge of probate. The duties of executor and administrator are the same. An executor is liable for any loss occurring to the estate through negligence, or for moneys paid to legatees before all debts are discharged. See WILL; DESCENT.

EXERCISE. See PHYSICAL CULTURE.

EXETER, the oldest continuously-inhabited city in England. It is in Devonshire, 173 miles southwest of London. It is typical of a large class of English towns, quiet, easy-going self-contained, picturesque. About it lies a fertile agricultural country; within its limits are numerous buildings which are monuments of its history. The cathedral, begun in 1112, is famous for the beauty of its architecture, particularly for its finely-decorated west front. It is the repository of many famous relics, among them an old Anglo-Saxon anthology. Remains of the castle of Rougemont are standing on the hill of Northernhay, which has been converted into a public park. The Guild Hall, a quaint structure of Elizabethan times, and parts of the wall erected by Ethelstan are among the show places. A canal connects Exeter with the Exe River at Topsham. Along the Exeter docks are caves cut in the cliffs for the storage of oils. Iron founding and the making of agricultural implements and paper are about the only manufacturing activ-

ities. Exeter was a British settlement long before the invasion of the Romans, who called it Isca Damnoniorum. Population, 1931, 66,039.

EXILE, *ek'sile*, banishment from one's native country by government authority. The term is sometimes applied to voluntary absence from one's native land for a period, or for life, but that is *expatriation*. Among the Greeks, exile was the punishment for murder; except in certain cases it meant confiscation of property and forfeiture of citizenship. In Rome it was the punishment for several crimes, notably treason, arson and poisoning. In both countries the accused was at liberty to anticipate forcible expulsion by going voluntarily into exile. Exile as a form of punishment has fallen into disuse. The last country to condemn people to exile was Russia. The czars sent thousands to Siberia; the Soviets followed the plan to a lesser degree.

EXODUS, *eks'o dus*, the second book of the Old Testament and of the Pentateuch (which see). It describes the deliverance of the Children of Israel from their Egyptian masters, their sojourn in the Wilderness and the organization of their formal worship. The book is in forty chapters. Many of its events are related in these volumes in the article **BIBLE**, subhead *Bible Stories*.

EXOGENOUS, *eks o'je nus*, **PLANTS**, plants which grow from or on the outside; in other words, which grow by additions to their exterior. The term is less employed than formerly. They are now called *dicotyledons*. See **BOTANY**.

EXORCISM, *eks'or siz'm*, the casting out of evil spirits by the conjurer's art. An opinion once prevailed that persons afflicted with such disorders as insanity or epilepsy were possessed by evil spirits. Over such persons incantations were pronounced, in the belief that this would drive out the devils. There were even persons who made a regular profession of exorcism.

EXOTIC, *eks o'tik*, in botany, a plant which is reared under different conditions of soil and climate than prevail in its natural habitat, and which requires especial care to be kept alive. Exotics from tropical lands are often seen in conservatories, in which artificial heat takes the place of tropical warmth. In a figurative sense an exotic is any rare thing which requires careful nurture.

EXPANSION, in physics, the enlargement or increase in the bulk of bodies, in consequence of a change in their temperature. This is one of the most general effects of heat, being common to all bodies, whether solid or fluid. The expansion of fluids varies considerably, but, in general, the denser the fluid the less the expansion; thus, mercury expands less than water, and water less than alcohol. Commonly, also, the greater the heat, the greater is the expansion; but this is not universal, for there are cases in which expansion is produced, not by an increase, but by a diminution of temperature. Water, in cooling, ceases to contract at 42° F., and it has its maximum density at 39.2° F. Just before it reaches the freezing point, 32°, it begins to expand again and expands more and more rapidly as the freezing point is reached. This expansion is about one-eleventh of its bulk, and accounts for the bursting of pipes and other vessels when water freezes in them.

EXPANSION, **TERRITORIAL**, OF THE UNITED STATES. See **UNITED STATES**, subhead *History*.

EXPECTATION, the value of the prospect of gaining some prize or property depending upon the happening of an uncertain event. A sum of money in *expectation* upon a certain event has a determinate value before that event happens. If the chances of receiving or not receiving a hundred dollars, when an event arrives, are equal, then before the arrival of the event the expectation is worth half the money. *Expectation of life* is the probable duration of the life of individuals of any given age. For further explanation of this phase, see **MORTALITY**, **LAW OF**.

EXPLORATION. See **NORTH POLAR EXPLORATION**; **SOUTH POLAR EXPLORATION**, and the references there given.

EXPLOSIVES are agents of destruction. They have their place in economic life, where they are made to perform beneficial work, and in warfare, where they are the agency of horror, suffering and death.

In economic life explosives are employed in mining, to loosen and crumble great masses of minerals so that miners can handle them easily; in agriculture, to remove stumps from land that is being cleared; in dredging, to remove solid obstructions, such as rocks, from a channel (see **HELL GATE**; **PANAMA CANAL**). The most common explosive for

industrial uses is dynamite (which see). Ordinary gunpowder is not powerful enough for even ordinary purposes.

Warfare has developed the most powerful explosives of which the mind can conceive. They are employed as the bursting charge in projectiles. The most destructive is trinitro-oluol, commonly called T. N. T.; two other terrible agencies are guncotton and cordite. (These three are discussed in these volumes.)

Among those explosives which are less familiar are Atlas powder, dualin, giant powder, lithofracture, vigorite and Vulcan powder. These have nitroglycerine as a base, with varying proportions of sodium nitrate, sodium chloride, potassium nitrate, manganese, sulphur, barium nitrate, etc., as component parts. Nearly all of them are over fifty per cent nitroglycerine. See CANNON; HOWITZER; MORTAR.

EXPONENT. See ALGEBRA; POWER (in mathematics).

EXPOSITION, *eks po zish'un*, **INDUSTRIAL**, an exhibition on a large scale of the products of industry and art. National and international expositions of to-day, the outgrowth of the small fairs that were common in Europe in the Middle Ages, aim primarily to show the results of the most advanced ideas in all branches of the arts and industries and thereby promote progress and interest in these fields. In pursuance of their object they provide not only for industrial displays, but also for educational and fine arts exhibits and for various features to entertain and amuse visitors.

The most famous of national fairs is that held which has been held annually at Nizhni Novgorod, Russia. The fair usually opens the last week in July and lasts until the middle of September, but it has not been held since 1916. The first great French Exposition Universelle, opened at Paris in 1855, has been followed by numerous similar international events. The magnificent international exposition held at Chicago, Illinois, in 1893, to commemorate the four hundredth anniversary of the discovery of America, marked a distinct advance over all preceding expositions in picturesque architecture and landscape.

Most buildings erected for exposition purposes are torn down as soon as the exposition is over. Sometimes an exposition plan embraces a well built structure intended to be permanent. Such are the Eiffel Tower and

the handsome Alexander III bridge at Paris, the Memorial Art Gallery at Philadelphia, the Art Gallery at St. Louis, and the Art Gallery in Jackson Park, Chicago, later the permanent home of the Rosenwald Museum of Science and Industry. Highly decorative effects in electric lighting and elaborate color ensembles were the distinguishing features of the Century of Progress Exposition.

Related Articles. Consult the following titles for additional information:

Alaska-Yukon-Pacific Exposition
Century of Progress Exposition
Centennial Exposition
Lewis and Clark Exposition
Louisiana Purchase Exposition
Pan-American Exposition
Panama-Pacific Exposition
South Carolina Exposition
World's Columbian Exposition

EX POST FACTO, *fak'toh*, **LAW**, a law which declares a deed to be a crime which was not a crime at the time it was committed. Such a law would reach backward in point of time and put a man in jeopardy for acts against which there was no law when he performed them. To illustrate: On January 1, assuming there is no legal restraint, a man whips his child in a cruel manner. On February 1 a law is passed which prohibits child beating, and it declares any offense of the kind occurring within a year past should come within the provisions of the statute. The father could then be punished for his action, although he had not violated a law when the deed was committed. *Ex post facto* laws are now unknown; in all enlightened countries they are expressly forbidden (see CONSTITUTION OF THE UNITED STATES, Art. 1, Sec. 8).

Such laws were the resort of tyrants in former days when they wished to put out of the way dangerous rivals or opponents who threatened their continuance in power.

EXPRESS COMPANY, a company or association which transports parcels for hire (see COMMON CARRIER). This business began in the custom of the stage driver of a former day who carried packages from one point in his route to another for a small consideration, but it was first introduced as a separate business in 1839. It eventually grew to immense proportions, and in addition to the delivery of parcels, it has extended its field to cover the issuance of checks, or money orders, similar to the postal money orders, the collection of debts and even the acceptance of deposits for safe keeping. By means

of C. O. D. methods, that is, collection on delivery, goods are transported for merchants and delivered to consumers upon payment of the purchase price. The use of express money orders, or letters of credit, in foreign travel is becoming more common, perhaps, than any other means of carrying funds. In Europe the express business is generally transacted by the post-office departments of the governments.

In 1918, during the World War, in furtherance of plans to conserve man power, avoid duplication of service and to lessen mileage on government-controlled railways, the United States government took over the operation of America's four leading express companies and they were combined into one concern, called the American Railway Express.

In Europe express companies on the American plan are almost unknown. The parcel post (which see) serves the people in the same capacity.

EXTENSION, in physics, that property of matter by virtue of which it occupies space. Even the minutest particle of matter has length, breadth and thickness. It is impossible to conceive of matter without these three dimensions. At first though we are apt to attribute only length and breadth to such bodies as a piece of tissue paper or of gold leaf. But this is a mistake, unless these bodies did possess thickness they could not exist as material objects. See **MATTER**.

EXTERRITORIALITY, *ex ter i toh ri al'i ti*, the doctrine that assumes that a man who is abroad on his country's diplomatic business is always on his native soil. In other words, a diplomatist carries his country with him. An American ambassador in London, sitting in his embassy, above which floats his country's flag, is assumed to be on United States territory, and wherever he goes in the British Isles the assumption continues in force.

A diplomat is not bound by the laws of the land to which he has been sent (although he scrupulously obeys those laws), but is under the laws of his own land. He cannot be called to account for a violation of foreign law, but the country to which he is accredited may ask his country to recall him.

This fiction of international law, called exterritoriality, arose out of the visits of the old-time kings of Europe to brother monarchs. A king could not lawfully leave his realm; even if he could do so it was unthinkable that

on a visit to another realm he should bow to the superior authority of another king. So it was arranged that wherever a king set his foot that spot became a part of his own country so long as the foot rested thereon.

EXTRACTS, *eks'trakts*, substances used in cookery, in medicine and as perfumes. They are variously prepared. The lemon, vanilla, and other extracts used in cooking are fruit or vegetable juices from which most of the water has been allowed to evaporate. The beef juice of commerce is prepared by a process of which evaporation is an essential part. Extracts made from digitalis, aloes, camomile are used extensively in medicine. The plants are soaked in alcohol, which draws out the juices and then evaporates, leaving the essence. Some extracts from flowers are obtained by distillation; the best method, however, is that called cold *enfleurage*. In this method the flowers are placed upon pure lard spread upon glass plates; when the lard becomes saturated with the essence it is dissolved in alcohol, which is then allowed to evaporate, leaving the extract.

EXTRADITION, *ex tra dish' un*, the delivery of a fugitive from justice by one country to another. The process is usually decided by treaties, specifying the crimes for which extradition is allowed; and usually extradition is neither asked nor granted when no treaty exists. Nations now generally refuse to surrender their own citizens for prosecution by foreign states, and they also decline to extradite men who are charged with merely political offenses. It has now become the general rule that the criminal who has been extradited cannot be tried except for the offense for which he was extradited.

Criminals are extradited from one state to another in the United States, on the demand of the executive of the state from which they have fled; the legal process is known as *requisition*. An executive called upon thus to surrender a man may, at his discretion, refuse to issue requisition papers, but usually the request is granted. The prisoner is tried where the offense was committed.

EYCK, *ike*, HUBERT VAN (1366-1426) and JAN VAN (1390-1441), two brothers identified with the revival of art in Holland. They lived first at Bruges, whence the younger brother is called John of Bruges, and afterwards at Ghent. They were among the first painters of Northern Europe to attempt to paint objects as they appear in nature. Jan

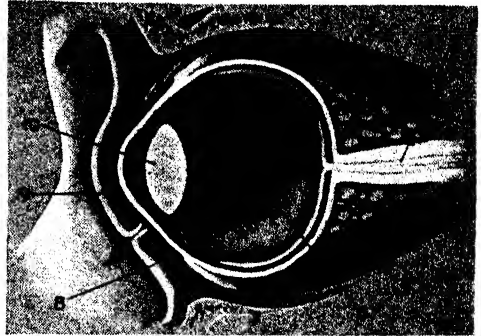
Van Eyck made many improvements upon his predecessors in linear and aerial perspective and in painting upon glass. The chief contribution which these brothers made to the Flemish School of painting was their revival of a process which prevented the paint from cracking. They painted chiefly religious subjects, figures of Biblical characters and dramatic scenes from Scripture. For the Cathedral of Ghent they did a series of panels representing *The Adoration of the Lamb*, their most ambitious work.

EYE, the organ of sight. Mankind has marveled at the invention of the camera, by which permanent records of landscapes, buildings, faces and countless other objects are made. Yet the eye, by which man obtains so many of his sense impressions, is more wonderful than the finest camera ever devised. To understand how it operates, one must know something of the way it is made. A study of its delicate apparatus, too, should impress one with the importance of taking care of the mechanism by which we view the world about us.

Parts of the Eye. The eye is a hollow ball filled with liquid and semiliquid substances. The walls forming the ball are arranged in layers, the outer one of which is a firm, tough tissue covering five-sixths of its surface, but not extending across the front. The part which can be seen is called the "white of the eye." This tissue is known scientifically as the *sclerotic*, and its function is to protect the eye and give it form. Continuous with this coat across the front of the eyeball is a transparent film known as the *cornea*, which bulges from the sclerotic like the crystal of a watch. It is sometimes called the "window of the eye." A dark membrane called the *choroid* lies inside the sclerotic. This membrane contains blood vessels which help nourish the tissues of the eyeball. As it extends forward the choroid joins another tissue called the *ciliary* body, which contains a muscle used in focusing the eye.

In front of the cornea, and joined to the ciliary body, is the *iris*, the circular colored part of the eye. It has a dark spot in the center called the pupil. The amount of light that enters the eye is regulated by muscles in the iris which make the pupil larger or smaller. When the light is bright the muscle contracts and makes the pupil smaller. For this reason, when a person goes from a

brilliantly lighted room into a darker one, he cannot see objects till the pupil dilates and allows more light to enter. The *retina*, an expansion of the optic nerve, lies under the



SECTION THROUGH THE LEFT EYE,
(CLOSED)

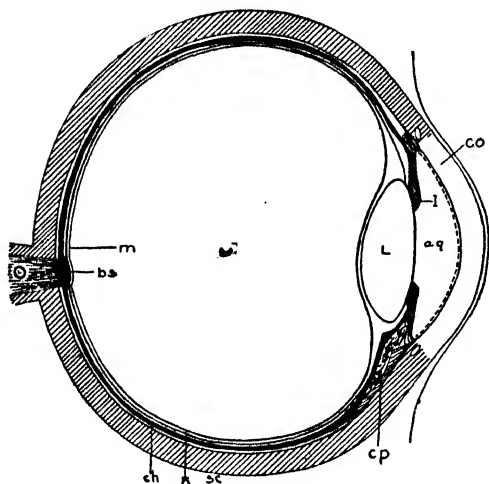
1, lifting muscle; 2, upper straight muscle; 3, optic nerve; 4, fatty cushion; 5, lower straight muscle; 6, vitreous humor; 7, lower cross muscle; 8, lower eyelid; 9, upper eyelid; 10, crystalline lens.

choroid and terminates near its edge. It is made up of several layers of nervous tissue. The point at which the optic nerve enters the eye forms the *blind spot*, because the nerve fibers here are not sensitive to light.

Directly behind the cornea and in front of the iris there is a space filled with a watery liquid called the *aqueous humor*. Back of the iris is the *crystalline lens*, the body which permits the eye to accommodate itself to objects at varying distances. This lens, in adults about one-third of an inch long and one-fourth of an inch thick, is inclosed in a capsule, or bag. It looks like clear glass, and is held in place by the *suspensory ligament*, made up in part of the *hyaloid* membrane and in part of fibers from the ciliary processes. The lens is that part of the eye that does most toward bringing the rays of light to a focus. Back of the lens and in front of the retina there is a substance about the consistency of thin jelly, called the *vitreous humor*.

The Act of Seeing. Light travels from luminous bodies to objects in space in waves called rays. When the eye rests on an object the light rays from the object strike the cornea, and pass through it to the chamber containing the aqueous humor. From there it passes through the pupil, the crystalline lens and the vitreous humor. These bodies bend the rays until they are brought to a meeting place on the retina, and on this layer

is formed a small picture of the object looked at. The optic nerve then receives the picture and carries it to a special center in the brain, where it is interpreted. It is an interesting fact that though a distinct picture is conveyed to the brain by each eye, in the center of sight these pictures are united into a single image. A comparison of the eye and the photographic camera shows that in the latter the rays of light are reflected upon a sensitized celluloid film or glass plate, just as the rays that enter the eye are reflected upon the retina. In each the rays are brought



CROSS-SECTION OF THE EYE

Parts: co, cornea; I, iris; aq, anterior chamber of aqueous humor; L, lens; cp, ciliary process; sc, sclerotic coat; R, retina; ch, choroid; V, vitreous body; m, yellow spot; bs, blind spot; O, optic nerve.

THE EYEBALL IN SECTION

Co, cornea	O, optic nerve
Sc, sclerotic	bs, blind spot
Ch, choroid	m, yellow spot
Cp, ciliary processes	L, crystalline lens
I, iris	aq, aqueous humor
R, retina	V, vitreous humor

Most diagrams of the eye omit the yellow spot. When the retina is looked at from in front two small marks may be seen on it. One of these is an oval depression about three millimeters across, of a yellow color, and is known as the yellow spot. It is situated directly in the horizontal axis from front to back and is the point of acutest vision. To one side and a little below is the blind spot.

to a focus by a lens. In the camera the focusing for objects at varying distances is accomplished by moving the lens backward and forward. In the eye the process of accommodation is brought about by changes of shape or curvature in the crystalline lens.

The Eyelids. The eye is protected by lids formed of soft tissue made firm by a tough material called cartilage. As a further pro-

Outline of the Eye

I. GENERAL DESCRIPTION

- (1) Position
- (2) Function

II. ANATOMY

- (1) Eyeball
 - (a) Coats
 - (1) Sclerotic and cornea
 - (2) Choroid
 - (3) Retina
 - (b) Iris
 - (1) Pupil
 - (c) Humors
 - (1) Aqueous
 - (2) Vitreous
 - (3) Crystalline lens
 - (d) Arteries and veins
 - (e) Muscles
- (2) Eyelids
 - (a) Skin
 - (b) Muscles
 - (c) Eyelashes
 - (d) Mucous membrane
- (3) Lachrymal glands and canals

III. DEFECTS AND DISEASES

- (1) As a double organ
 - (a) Lack of association in movement
 - (b) Difference in focus
 - (c) Nearsightedness
 - (d) Farsightedness
 - (e) Color blindness
- (2) Each as a single organ
 - (a) Conjunctivitis
 - (b) Tumors
 - (c) Inflammations of the cornea
 - (d) Scleritis or inflammation of the sclerotic coat
 - (e) Cataract
 - (f) Glaucoma
- (3) As a result of other diseases

Questions on the Eye

What is the shape of the eyeball?

What is the sclerotic? Cornea? Choroid? Iris?

What is the pupil?

A person going from a brilliantly lighted room into a dark one cannot see anything at first. Why?

How is the amount of light that enters the eye regulated?

Where is the blind spot?

tection each lid is fringed with fine short hairs. These lashes help to prevent the entrance of dust. If particles of dirt happen to find their way to the eyeball the sensitive membrane at once sets up a disturbance in the involuntary muscles of the lids, which move up and down and usually work the foreign particle to the corner of the eye and out. Ridding the eye of an offending particle is facilitated by the moisture supplied by the *lachrymal gland*, an oval gland the size and shape of an almond situated at the outer and upper part of each eye socket. Moisture from this gland, which is also the source of tears, keeps the surface of the eyeball constantly washed and drains through a duct into the nasal passage. Between the hairs are glands that secrete an oily substance which keeps the eyelids pliable and prevents the tears from running over them, except in crying. The eyelids are lined with a delicate, very sensitive mucous membrane, which is reflected over the front of the eyeball.

Care of the Eye. The crystalline lens is subjected to severe strain in the ordinary routine of life, and it should not be unnecessarily taxed. One can lessen the demands made upon it by abstaining from reading in a poor light, or on a moving train. It is also definitely established that viewing moving pictures at too short a distance from the screen is hard on the eyes, if the practice is indulged in to excess.

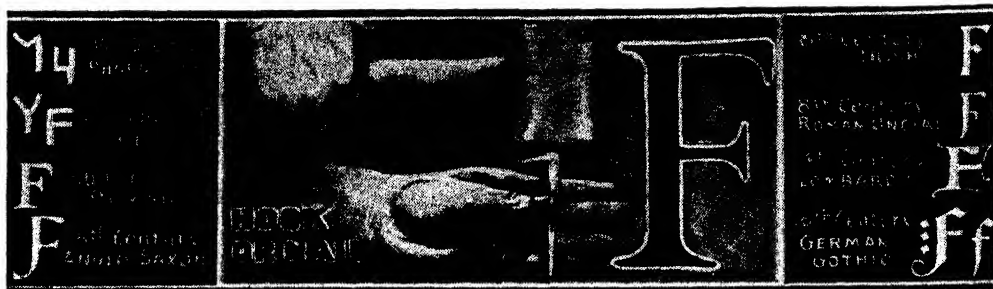
When the eyes are tired they should have rest like other parts of the body. Many eye diseases are acquired through carelessness in regard to hygiene. No one should ever wipe the face on a public towel, or touch the eyes with dirty hands. Signs of eye trouble are warnings that should be heeded. If there are evidences of strain, failing vision or trouble of any sort a competent oculist should be consulted. Properly-fitted glasses may save the wearer from ultimate blindness.

Related Articles. Consult the following titles for additional information:

Astigmatism	Conjunctivitis
Blindness	Iritis
Camera	Lachrymal Glands
Cataract	Lens
Color Blindness	Light

EZE'KIEL, meaning *God will strengthen*, was one of the four greater prophets mentioned in the Old Testament, author of the book that bears his name. He was the son of a priest and was carried away captive by Nebuchadnezzar, when the latter captured Jerusalem, probably about 597 B. C. Ezekiel dwelt by the river Chebar, a branch of the Euphrates, and commenced to prophesy about 592 B. C., continuing for about twenty years. The book of *Ezekiel* divides itself into two parts; the first, including chapters I-XXXIX, contains the prophecies delivered before and after the destruction of Jerusalem; the second, chapters XL-XLVIII, contains a vision of Israel restored.

EZ'RA, a Jewish scribe and priest, called the "true founder of Judaism." Brought up in the time of the captivity at Babylon, in his day the center of Jewish wealth and culture, and moved to pity for the Jewish community at Jerusalem, he conceived the idea of infusing new life and new ideals into it by going over with a band of zealously religious Jews from Babylon on a mission of reform. He enlisted the aid of Artaxerxes I, about 458 B. C., and was invested with authority for his purpose. "Ezra invested the Jewish law with a sanctity and influence it had never before possessed and made it the possession of the entire community and endowed the Jewish people with a cohesive power which was proof against all attacks from without." According to Josephus, Ezra died in Jerusalem; others say he returned to Babylon and died there at the age of 120 years. His mission to Jerusalem occurred at the time of Nehemiah's governorship.



F, the sixth letter of the English alphabet, the sound of which is formed by pressing the upper teeth on the lower lip and allowing the breath to escape between them. The sound is distinguished from that of *v* in that it is pronounced with the breath instead of the voice. In form the letter **F** is the same as the ancient Greek digamma, which was probably sounded like our *w*.

In music, **F** is the fourth note in the major scale of **C**.

FABIUS, an ancient and renowned family of Rome. Among its celebrated members were **FABIUS MAXIMUS**, whose policy of defensive warfare was so successful against Hannibal in the second Punic War, and **FABIUS PICTOR**, who lived about the same time and was the earliest Roman historian. He was known as "Fabius the Delayer," and because of his masterly strategy in retreat, holding back the enemy meanwhile, George Washington was called the "American Fabius."

FABLE, in literature, a term applied originally to every imaginative tale, but confined in modern use to short stories, either in prose or verse, in which animals and sometimes inanimate things are made to act and speak with human interests and passions, for the purpose of pointing a moral. The fable consists properly of two parts—the symbolical representation, and the application, or moral, which must be apparent in the fable itself. The oldest fables are of Oriental origin, and among these the Indian fables of Pilpai, or Bidpai, and the fables of the Arabian Lokman, are celebrated. Among the Greeks, Aesop was the master of a simple but very effective style of fable. The fables of Phaedrus are a second-rate Latin version of those of Aesop. In modern times Gellert and Lessing among the Germans, Gay among the English and Kryloff among the Russians

are celebrated; but the first place among modern fabulists belongs to the French writer La Fontaine.

FABRE, *fa'br'*, **JEAN HENRI**, (1823–1915), a French naturalist. He was born in poverty and obliged to contend against it all of his life. In the hours left from his work as a common laborer he became an entomologist and was finally made professor of physics at the College of Ajaccio, and later a professor at the Lycée of Avignon. Not until he was eighty years old did he win fame as an authority on insects. His charming tales of insect life have been the marvel of all who read them. His most famous work is his *Entomological Memoirs*.

FACADE, *fa sad'*, or *fa sade'*, the face or front of a building viewed from without. It usually contains the principal entrance. When applied to the faces other than the front of a building, it is used with a qualifying term, as *rear facade*, *lateral facade*, *court facade*.

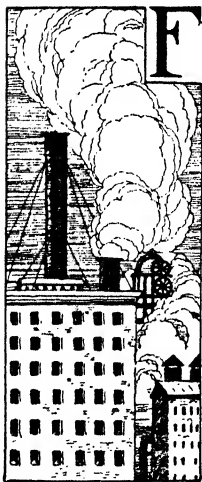
FACE, *fase*, **THE**, the front part of the head, including the forehead, eyes, nose, mouth, cheeks and chin. Exclusive of the thirty-two teeth, it is composed of fourteen bones, all but two of which, the lower jaw and the *vomer*, which separates the nostrils, occur in pairs. The two bones of the upper jaw carry the upper teeth and form most of the hard palate separating the mouth from the nose. The two *palate* bones complete the hard palate. The two *malars* are the cheek bones. The two *nasal* bones form the bridge of the nose. The two *lachrymals*, or *tear bones*, lie between the eye sockets and the nose. The two *turbinated* bones form the outer wall of the nostrils. Of all these bones only the lower jaw is movable, being articulated with the base of the skull. In brutes the jaws project much more than in men and form the prominent feature of the

face, while the forehead recedes. See SKELETON.

FACES, FALSE, pasteboard or cloth masks representing human faces. They are used either as a protective screen or as a disguise. Hollow papier-maché masks which are caricatures of the human face are much enjoyed by children at Halloween. They are worn also at masquerades. See MASKS.

FACIAL NEURALGIA, *fa'sh'l nu ral'je ah*. See TIC DOULOUREUX.

FACTOR, *fak'tor*. In arithmetic factors are numbers which when multiplied together produce a given number. Every number has two factors, itself and 1, and many numbers have other factors. For example, 28 equals 28 times 1, and it also equals 7 times 4, or 7 times 2 times 2. When a number, such as 7, has no factors except itself and 1, it is said to be a *prime* number; a number having factors besides itself and one, as 28, is said to be *composite*. In algebra the factors of a given quantity are the expressions which when multiplied together produce it; for example, the factors of $a^2 b^2 = a, a, b$ and b . Factoring is the process of separating a number into its factors.



FACTORY AND FACTORY LEGISLATION.

A factory in its modern sense is an establishment in which several persons coöperate to produce a commodity, the process of manufacture being divided into several stages, each of which is the special work of a separate class of laborers. The development of the factory system has its foundation in the principle, which is now well established, that economy of time, effort and financial expense and an advantage in the quality of production arise when several coöperate in the production of a complex article.

The Factory System Discussed. The benefits of the factory system have been enormous. The division of labor has resulted in a vast improvement in the quality of the article, in a great saving of time and, therefore, the lessening of price; this has led to an increased demand, which, in turn, has improved the demand for labor raised wages the standard

of living and the general condition of working people. Its evils have been also numerous, but are less important than is usually believed. Women and children have doubtless been employed in greater numbers under the factory system than before; but their employment did by no means begin with the institution of the factory system. Insanitary conditions prevail in many factories; but they are not to be compared in their evil results with the conditions prevailing in sweatshops and tenement houses, not yet entirely eliminated.

The great subdivision of labor perhaps requires a somewhat lower grade of intelligence, since each worker is required to understand but a small part of the whole process of manufacture. However, the development of machinery has made necessary a deftness of movement and an alertness of mind which were never before required, and the gathering of many workmen together, with the consequent discussion of their needs and conditions, has stimulated the minds and raised the ideals of the workmen as a class. Perhaps the most important result of the factory system has been the change in the relations of capital and labor. Under the old system of manufacture the small capitalist was also a laborer, working side by side with his employes; under the new order this intimate contact was broken, and interests gradually grew wide apart. Labor unions came into existence to provide unison of effort in behalf of justice to workmen. In their early days they were bitterly opposed by employers, but to-day there exists a feeling that both classes have common interests; employers find practical advantages in dealing with their employes as a unit, wherever there is sincere effort toward reasonable ends.

Factory Legislation. Side by side with the development of the factory system has been the development of labor legislation, most of which has been directed to the improvement of the sanitary conditions of work and the protection of the health of the workers in factories.

This legislation has taken chiefly three directions: (1) the limitation of child and female labor, (2) the restriction of the hours of labor and (3) the improvement of the conditions of factory work. Most states now prohibit child labor, the age limit being placed variously at from ten to fourteen years. Many states limit, and some prohibit, work

by adult women in factories or mines, and a vast majority now limit the hours of work, the average maximum probably being from forty to forty-eight hours per week.

Trades unions have played an important part in securing these reforms and are now devoting their energies to the universal passage of laws limiting the hours of labor to 30 in one week. In 1918 the United States Steel Corporation, the greatest private employer of labor in the world, placed all its men on the eight-hour basis. The efforts of labor unions have also aided in the accomplishment of another important reform, namely, the increase of the liability of employers for accidents to their workmen. All of these laws have required for their successful enforcement the institution of inspection systems. Inspection is now carried on in almost all states, with a view to bringing to court violators of factory laws.

Beginnings of the Factory System. The factory system first began to be important about the middle of the eighteenth century in England, when the inventions of Arkwright, Cartwright, Hargreaves and others led to the substitution of large and heavy machinery for hand labor with the small, simple tools which had been used previously. The system received a great impetus from the invention of steam power, which again increased the speed with which an article could be produced, caused a saving of labor and money and admitted of the establishment of manufacturing plants wherever conditions were most favorable. The next important step was the improvement in transportation facilities, and the last was the development of the patent system, by which the labors of inventors were protected and preserved to themselves, and the institution of labor-saving machinery was no longer opposed or its inventors persecuted.

The factory system was introduced into the United States about 1790 by Samuel Slater, but its development was slow until 1840. After that time, as population increased, the tendency to concentration of population increased, and the natural consequence was a development of coöperative effort in manufactures. This was vastly hastened by the development of electrical appliances.

Related Articles. Consult the following titles for additional information:

Child Labor	Labor Organizations
Division of Labor	Minimum Wage
Employer's Liability	Sweatshop System

FAHRENHEIT, *fah'ren hite*, GABRIEL DANIEL (1686-1736), a German physicist, distinguished chiefly for the improvements he made in the thermometer. As a manufacturer of meteorological instruments he made the experiment of putting mercury instead of alcohol into thermometer tubes and thus greatly improved the instruments. This led to the invention of a new scale of measurement, which was named for him. See THERMOMETER.

FAIENCE, *fa yaNs'*, a kind of glazed and painted earthenware. The name is derived from Faenza, a city of Italy, an important center of the Italian pottery industry at the time this ware was perfected. Faience was made as early as the fourteenth century; the best specimens are those of the fifteenth, sixteenth and seventeenth centuries. The tiles of Della Robbia, the pottery called Delft and majolica ware are finished by the faience process. The pottery is covered with an opaque enamel, which is burned in a kiln, decorated, and then burned again.

FAINTING, or **SYNCOPE**, *syng'ko pe*, a sudden suspension of sensation and of the power of motion. It may be produced by loss of blood, pain, emotional disturbance or by organic or other diseases of the heart. The direct cause is the temporary checking of the heart action, resulting in a diminishing of the blood supply sent to the brain. A person fainting should be laid upon the back, with his head and shoulders slightly lower than his body, and his clothing should be loosened wherever it impedes circulation. Cold water may be sprinkled on the face and stimulating odors applied to the nostrils. Protracted cases need the advice and treatment of a physician.

FAIR, a meeting held for the purpose of selling goods or exhibiting the products of a country or of several countries. In the Middle Ages fairs were of great importance and were specially privileged and chartered by princes and magistrates, and public proclamation was made of their commencement and duration. Modern facilities for communication have much diminished the necessity for periodical markets. In Europe the most important fairs of the present day are those held at Leipzig and Frankfort-on-the-Main in Germany, at Lyons in France and at Nijni-Novgorod in Russia. These last are the largest fairs in the world. Fairs in the sense of markets are almost unknown in the United

States, but the term is usually given to bazaars or collections of the products of industry for public exhibition and competition.

FAIRBANKS, ALASKA, is 471 miles north of the sea at Seward and is the terminus of the government railroad which extends from Seward northward. The town is on the Tanana River, an important branch of the Yukon. Near by are extensive gold fields, now being reworked by placer dredges. At Fairbanks the Government maintains the Alaska Agricultural College and School of Mines. Although but a few miles south of the Arctic Circle, flowers and vegetable gardens in the region flourish during the short summer. The town has a central steam-heating plant for stores and residences. Population, 1930, 2,101.

FAIRBANKS, CHARLES WARREN (1852-1918), an American statesman and Vice-President, was born on a farm in Ohio, educated at Ohio Wesleyan University and admitted to the bar in 1874. He practiced law for a number of years in Indianapolis. In 1897 he was elected United States Senator from Indiana and was reelected in 1903. In 1898 he was a member of the British-American joint high commission and chairman of the American commissioners to adjust fisheries disputes with Canada. In 1904 he was elected Vice-President of the United States on the Republican ticket, and in 1908 he was chairman of the American commissioners to the Quebec Ter-Centenary. In 1916 Fairbanks was nominated for Vice-President on the ticket with Charles Evans Hughes, but was defeated in the ensuing election. Fairbanks was probably the last Vice-President of the United States of whom it can be said that he was born in a log cabin.

FAIRFAX, THOMAS (1692-1782), the sixth **BARON FAIRFAX**, was an important Virginia colonial. His father owned 6,000,000 acres of land in the colony—almost a fourth of all English Virginia. Thomas settled permanently in America in 1746. His younger brother, an earlier arrival, married his daughter to Lawrence Washington (brother of George), and this event brought Thomas Fairfax and George Washington into a close friendship, which even the Revolutionary War did not terminate, though Fairfax was a strong loyalist. His personal safety was assured and his property was not disturbed during the war. His home was near Winchester.



FAIRIES, small folks, existing only in the imagination, found in the lore of every nation, loved and believed in by children everywhere. One likes to think of fairies as Shakespeare conceived them in *A Midsummer Night's Dream*:

Over hill, over dale,
Through bush, through
brier,
Over park, over pale,
Through flood, through
fire,
I do wander everywhere,
Swifter than the moon's
sphere;
And I serve the fairy
queen,

To dew her orbs upon the green.
The cowslips tall her pensioners be:
In their gold coats spots you see;
Those be rubies, fairy favors.
In those freckles live their savors.
I must go seek some dewdrops here,
And hang a pearl in every cowslip's ear.

But, as every one knows who has tasted the delights of Andersen's and Grimm's *Fairy Tales*, not all fairies live among the flowers, with dewdrops for pearls. There are queer fairies that look like witches, akin to the fairy godmother whose wand turned Cinderella's ragged dress into a ballroom gown; there are good and evil fairies, and fairies that can turn into all kinds of different shapes. Each nation, too, has its own ideas as to what the fairy folk should be called.

In Northern Europe the fairies are divided into two races: the *elves*, graceful, sportive fairies who dance about the woods and often take a kindly interest in the affairs of human beings; and the *dwarfs*, or *gnomes*, who dwell underground and are the guardians of the jewels and metals hidden in the earth. They are for the most part somewhat malicious spirits, although their cleverness and their ability to forge wonderful weapons make them of great use to mankind if they can be induced to be favorable. A part of the dwarfs, known as *trolls*, live in the hills and often emerge to steal from men not only personal property but women and children. These little beings are regarded, not as immortal, but as living for a very long period.

Besides these spirits which inhabit the earth, there is supposed to be, by most

Northern nations, a class of *nixies*, water spirits, who, though not distinctly malicious, are very fond of enticing men or carrying them off by force to their caves in the sea. Among these nixies the most famous was the Lorelei, who from her cliff on the Rhine lured sailors to death by her beauty and the sweetness of her song. *Undines*, a sort of water spirits, are supposed to enter sometimes into various relations with human beings. If an undine marries a mortal and bears a child, she receives a soul. In Ireland, *pixies* are certain small beings into whom enter the souls of children who die unbaptized. In Ireland, too, as in Scotland, there is a belief in *banshees*, little old women who take up their abode in all houses of any importance and announce the death of a member of a family by wailing or by appearing in mortal form. Perhaps the most perfect ideal of the fairy type is the Persian *peri*, who lives upon perfume and tries by loving deeds to win an entrance to paradise, from which she is shut out by her lack of a soul.

Of course each nation adapts its fairies somewhat to its own customs. Thus, the Russian fairy is regarded as clad always in furs; the Chinese fairy wears a queue, and the Hindoo fairy has the wisdom of the Brahmins. English fairies are thought of chiefly in connection with the flowery fields and woods, about which they are supposed to dance on summer nights.

American children are especially fond of the Brownies and their more recent kinfolk, the Kewpies.

FAIRMONT, W. VA., chartered as a city in 1899, is eighty miles southeast of Wheeling, on the Monongahela River and on the Baltimore & Ohio and Pennsylvania railroads. A state normal school is located here, and the city has a fine courthouse and a new Federal building; a million-dollar bridge spans the river. There are extensive coal mines in the vicinity. Important industrial establishments include flour mills, foundries, planing mills, machine shops and glass works. The commission form of government is in operation. There is an emergency landing field. Population, 1930, 23,159.

FAIRY RING, a circle seen in a grassy area, richer in color than its surroundings. It is caused by a fungus, and the color richness is due to the fertilizing quality of the fungus as it decays. Fairy rings play an important

part in fairy tales and in the folklore of many European countries, especially England, where it was once believed they were the boundaries of the dancing grounds of fairies. No person would presume to step upon ground so honored by dainty, dancing fairy feet.

FAITH. The best definition of faith that has ever been penned is declared to be that by Paul in his *Epistle to the Hebrews* (XI, 1): "Now faith is the substance of things hoped for, the evidence of things not seen." It is quite apart from knowledge, for knowledge is revealed and is demonstrable by rules of reason. Faith is profound acceptance of the truth of something that is not apparent to the eye or the senses or that may not be disclosed by the profoundest processes of reasoning. It is an attitude of mind that forces belief even against grounds for dissent and tendency to reasonable doubt. Quite aside from religious exaltation induced by faith that will not be denied, this attitude ever has been a moving power in the world of material things, a spur to mental and physical accomplishment. Man rises only on wings of faith.

FAITH CURE, a term applied by psychologists to the healing of bodily ills through mental action. It is also used in a restricted sense to define the cure of disease through prayer and the exercise of religious faith. The sect founded by John Alexander Dowie (which see) lays great emphasis upon divine healing, and it is an important part of the creed of several other religious bodies. The visiting of shrines, touching of relics and similar practices are other phases of faith cure.

FAKIRS, *fa'kurz*, or *fa'keerz'*, a word originally meaning *poor men*, fanatics, met with chiefly in India and the neighboring countries, who retire from the world and give themselves up to contemplation. They are properly of the Mohammedan religion, but the term is often used for a mendicant of any faith. They are found living both in communities and in solitude. The wandering fakirs gain the veneration of the lower classes by absurd penances and self-mutilations. The number of fakirs in the far East, particularly in India, is beyond computation.

FALCON, *faw'k'n*, a hawk famous for its strength, symmetry and remarkable power of flight. Its claws are sharp and hooked, its short, stout legs are heavily feathered

and its curved beak is armed with a sharp point. The peregrine falcon was the one most used in hunting game (see below), but there are several other species that are almost equally powerful and graceful. The Greenland falcon is one of the best-known.

Falconry, or Hawking, is the pursuit of game by means of trained falcons or hawks.

The birds are trained to seize their prey and return with it to their masters. In the Middle Ages falconry was the favorite sport of princes and nobles; and, as ladies could engage in it, it became very prevalent. In Germany Henry the Fowler and the Emperor Frederick the



FALCON

Second were much addicted to this sport, the latter having written a work on falconry. In France it reached its height under Francis I, whose grand falconer had under him an establishment of fifteen nobles and fifteen falconers, costing annually about 40,000 livres. In Britain it was practiced among the Anglo-Saxons, but grew still more in favor after the Norman Conquest, only to decline in the seventeenth century, when firearms came into general use. However, it has never wholly died out in Europe. The British Falconers' Club is maintained for the promotion of falconry, and the sport is practiced on a few private estates.

FALCONIO, DIOMEDE (1842-1917), an American Roman Catholic cardinal, born in Italy. In 1860 he entered the Franciscan Order, and at the age of twenty-three was sent to America as a missionary, soon becoming a naturalized citizen. In 1866 he was ordained a priest. Father Falconio was appointed professor of philosophy at Saint Bonaventure's College at Allegany, N. Y., and in 1868 became president of the college and seminary. In 1871 he went to Newfoundland, where he remained ten years. After that time he spent a few years in Italy in prominent positions in the Church, but in 1899 was appointed by the Pope first apostolic delegate to Canada, from

which place he was transferred to Washington in a similar capacity in 1902. On November 27, 1911, Monsignor Falconio and Archbishops Farley and O'Connell were named by the Pope as American cardinals.

FALKLAND, *fawk'land*, **ISLANDS**, an island group belonging to Great Britain, in the South Atlantic Ocean, about 300 miles east of the Straits of Magellan. The group consists of two large islands, East Falkland and West Falkland, covering respectively about 3,000 and 2,300 square miles and a great number of smaller ones surrounding them. The total area is about 7,500 square miles. They are hilly and boggy, entirely destitute of trees, but covered with a variety of grasses very nutritive for sheep and cattle, the rearing of which is the principal industry. Fish and sea fowl abound. Wool, frozen meat, hides and tallow are the chief exports.

The Falkland Islands were discovered by Davis in 1592. Settlements were afterward formed on them by the French, Spaniards and English, alternately, but the latter retained possession of them. The colony has a governor and other officers appointed by the crown. Port Stanley, in East Falkland, is a thriving settlement. Argentina does not recognize Britain's claim to ownership, but herself claims the islands on the basis of long occupation by Spaniards. Population of the group, in 1931, about 3,000.

FALLIÈRES, *fah'lyair'*, CLEMENT ARMAND (1841-1931), a French statesman, President of the French Republic. His political career began in 1876, when he was elected to the national Chamber of Deputies. He served in succession as Minister of the Interior, Minister of Public Instruction and Minister of Justice. In 1890 he was elected to the Senate, of which he became president when Loubet was elected President of the Republic. His election to the Presidency took place in 1906; his term ended in 1913.

FALLING BODIES. Any unsupported body will fall to the ground and will roll to the lowest spot near where it hits the ground before it comes to a position of rest. It does so because of the attraction of gravitation, which is a "pull" by which every particle of matter is attracted to every other particle of matter (see GRAVITATION).

A stone is attracted to the earth, and the earth is attracted to the stone. In the theory both bodies move towards each other; the smaller mass moves farther, for the attrac-

tion of the other mass, being immeasurably greater, overcomes that of the former and exerts the residue of its own powerful "pull" upon the other object. In falling, a body drops in a straight line directly towards the center of the earth.

• In the air, bodies fall with unequal velocities; for instance, a piece of paper falls more slowly than a bullet, but this is because of the peculiar shape of the bodies, that of the paper being such as to receive much resistance from the air, while the bullet receives comparatively none. If a feather and a bullet or a piece of paper and a bullet are placed in a long glass tube, from which the air has been taken, they will fall with an equal velocity.

FALL LINE. See COASTAL PLAIN.

FALL RIVER, MASS., an important manufacturing city of Bristol County, situated on the Taunton River at its mouth on Hope Bay, 50 miles south of Boston and on the New York, New Haven & Hartford Railroad. The Fall River Line of the New England Steamship Company and other steamship lines connect the city with both Atlantic and Pacific ports.

Hydro-electric power is derived from the plant on the Taunton River. Industries produce needles, paper boxes, pocketbooks, hats, machinery, leather products, trunks, and cotton goods worth as much as \$120,000,000 or more annually under favorable conditions.

About one-third of the population is foreign-born. These immigrants have come from Canada, Great Britain, Portugal and the Atlantic islands. An unusual proportion of the inhabitants are women.

Fall River was formerly a part of Free-town, which was settled by people from Plymouth Colony; it was incorporated under its present name in 1803. Two disastrous fires, in 1843 and in 1928, have occurred. A city

plan was adopted in 1923 which includes a complete readjustment of streets and takes advantage of the natural resources of the site. The municipality is governed by a city manager and council. Population, 1930, 115,274.

FALSE IMPRISONMENT, the detention of a person without due process of law. If a person is confined as the result of perjury of another, such confinement is false imprisonment, and the perjurer may be punished. If one is forcibly detained in a room and deprived of his liberty, with ill intent on the part of his captors, the guilty parties are liable to subsequent arrest and punishment.

It is not a case of false imprisonment when a jury convicts an innocent man on a criminal charge, if the trial has proceeded in an entirely legal manner. Such an unfortunate victim, if later released, has no means of redress, although laws on the subject have been considered in many states.

FALSE PRETENSES, in law, is defined as false representations and statements, made with a design to obtain "money, goods, wares and merchandise" with intent to cheat. Conviction under such a charge may incur either a jail sentence or a fine, or both.

FAMILY, in biology, a group of plants or animals which have a common resemblance or connection. In the general scheme of classification the family is the group next higher than the genus (which see), and a family therefore consists of a group of genera. The Easter lily, the tulip, the trillium and the wild onion belong to the lily family; the bamboo, esparto, sugar cane and meadow grass to the grass family, the house cat, lion, leopard and tiger to the cat family, and so on.

The family is a persistent social unit in every community known to human history. The two most common forms of the family are the case where one man and one woman with their children live together; and less frequently the case where one man with two or more wives and their children constitute the family. Around these simple units kinsmen may be gathered as in the patriarchal family.

Social experiments made under natural impulse or by community agreement have proved that happiness is most assured when one husband and one wife with their children are united in life-long common interests. See BOTANY; ZOÖLOGY; CLASSIFICATION.

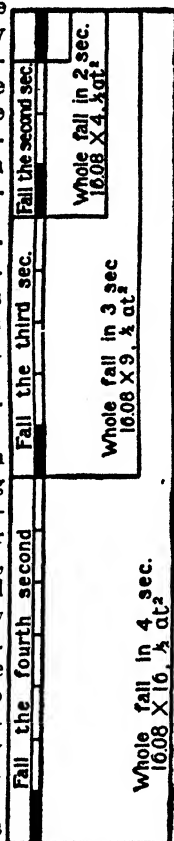


DIAGRAM ILLUSTRATING LAWS OF FALLING BODIES

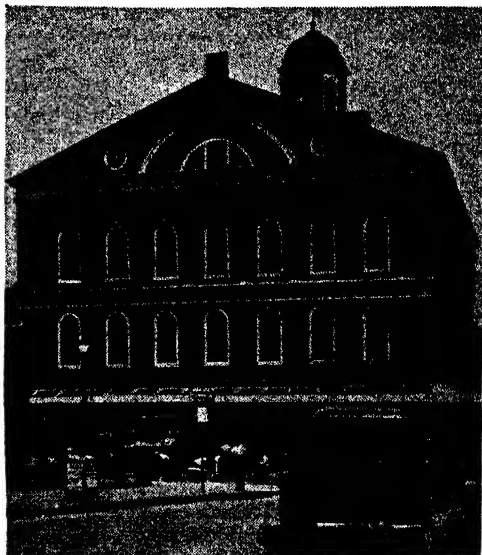
FAMINE, a scarcity of food affecting large numbers of people and causing much suffering. Famines are usually caused by the failure of a crop on which the inhabitants of a country largely depend for sustenance. Crop failures may be due to lack of rain, destructive insects or floods; they are not infrequently the accompaniment of war. In former times famines were much more frequent than they are to-day, for modern methods of transportation and communication enable a famine-stricken country to get food from its fortunate neighbors.

The worst famines in history have been those of China and India. In the former country a famine in 1877 killed more than 9,000,000 persons. Another Chinese famine occurred in 1888 and 1889, when the Yellow River overflowed; and as recently as 1902 more than a million persons starved. The Indian famine of 1837-1838 resulted in 800,000 deaths in the northwestern part of the country; that of 1865, which overtook Bengal and Orissa, cost those sections 1,000,000 lives, while the scourge of famine ten years later killed another half million in Bombay, Madras and Mysore. The British government has taken steps to solve the problem in India. Besides setting apart certain revenues, means of communication have been multiplied, so that relief can more quickly reach famine victims. In 1921 more than 35,000,000 people in China were famine-stricken; in 1922 other millions in Russia were in jeopardy because of wheat-crop failure, and millions died.

FANDANGO, a spirited Spanish dance which has been popular since the sixteenth century. It is danced by two persons in 6-8 time, and is characterized by snapping of the fingers, stamping of the feet, and beating of castanets. The dancers do not touch each other, but move in unison, and end the dance in a rapid whirl.

FANEUIL, fan'el, HALL, a public building in Boston, built by Peter Faneuil in 1742, as a gift to the town. It comprised originally a market house, a townhall and several assembly rooms. It was burned in 1761, rebuilt in 1763, and enlarged in 1805. The hall is famous as the place where political meetings were held and stirring speeches were made at the outbreak of the Revolutionary War, whence it derived the name "Cradle of American Liberty." It was here, in 1773, that an immense public meeting was

held, at which the "Boston Tea Party" was organized. Wendell Phillips made his first anti-slavery speech in this building, in 1837, at a memorial meeting in honor of Elijah Lovejoy, killed by a mob at Alton, Ill. The



FANEUIL HALL

hall could not be rented but could be used without cost by permission of the aldermen, for worthy purposes. Its semi-public character gave a peculiar authority to all meetings held there. The illustration is of the building as it appears to-day.

FARADAY, MICHAEL (1791-1867), one of the world's greatest chemists and physicists. He received a meagre schooling, and at an early age went to work for a book-binder. Natural ambition was not to be hindered, however, and during his leisure time he read scientific books and made experiments in electricity. He became acquainted with Sir Humphry Davy through attendance at lectures at the Royal Institution, and Davy appointed him his assistant. He rapidly rose to eminence in this institution, with which he remained fifty-four years. It was while in the chair of chemistry at the Royal Institution that he made most of his great electrical discoveries, which confirmed him in his position as one of the most successful experimenters ever known in physics. In 1835 Lord Melbourne offered him a pension of \$1,500 a year in recognition of his service to science. Among his published works are the following: *Researches in Electricity*, *Lectures*

on *Non-metallic Elements, Lectures on the Forces of Matter and Lectures on the Chemical History of a Candle.*

FARALLONES, *far'a lohns*, a group of small, rocky islands in the Pacific Ocean, about thirty miles from the entrance to San Francisco Bay. They are politically a part of San Francisco, and have been made a Federal bird reservation, as they are the nesting ground of innumerable sea gulls and other marine birds. On the most southerly island there is a lighthouse.

FARCE, *fahrs*, a form of dramatic writing characterized by ludicrous situations and conversations. Any form of absurdity or improbability is allowable, provided only that it provokes laughter. Originally the farce was considered merely as comedy in a somewhat exaggerated degree, but in the eighteenth century it came to be regarded as a distinct form of drama.

FAR EASTERN QUESTION, the name used to indicate the problem of international politics growing out of the development of the interests of western powers in Asia, especially in those countries bordering upon the Pacific. The problem assumed especial importance during the last quarter of the nineteenth century, when the Chinese Empire seemed on the point of a rapid decline and appeared to be an easy prey to the commercial nations of Europe. China's weakness was further revealed by its war with Japan in 1894 and 1895, which resulted in a complete victory for the island empire. It was then, also, that Russia and Germany intervened to prevent Japan from reaping the full fruits of its victory, and at the same time to secure for themselves commercial ports and coaling stations, from which to extend their spheres of influence in the East.

The unexpected entrance of the United States into the affairs of Asia was the result of the Spanish-American War, which threw into its hands the control of the Philippines. The influence of America, however, was clearly shown at the close of the Boxer Rebellion (which see) in 1900, when by diplomacy on the part of the United States government the interested nations promised to maintain the so-called "open door" policy in China.

At the outbreak of the World War Great Britain, France, Germany, Japan and the United States had important interests in the Far East. In 1915 the possessions of Germany were taken by Japan and Great Brit-

ain, thus depriving the central empires of bases in the Pacific Ocean. In 1931, on the pretext of protecting her treaty rights, Japan invaded Manchuria and there set up the state of Manchukuo, in defiance of China and of the League of Nations. Japan thus became the dominant power in Eastern Asia. See **NATIONS**, **LEAGUE OF**.

FARGO, *fah'go*, N. D., the county seat of Cass County, on the Red River of the North, 250 miles northwest of Minneapolis, on the Northern Pacific, the Great Northern and a branch of the Chicago and North Western railroads. It is across the river from Moorhead, Minn., with which it is connected by an electric railway. The city has three parks, aggregating nearly a hundred acres, a \$150,000 Federal building, a Carnegie Library and two hospitals. The city is an important grain market and also has a large trade in agricultural implements. Fargo is the seat of the state agricultural college, with a college enrollment of 1,500, a conservatory of music, three business colleges, and several trade and mechanical schools, and it is the see city of the Catholic diocese of Fargo and of the Episcopal diocese of North Dakota. There is an airport. Commission form of government is in effect. Population, 1930, 28,619.

FARLEY, JOHN CARDINAL (1842-1918), one of the cardinals of the Roman Catholic Church who was an American from his eighteenth year. He was in County Armagh, Ireland, and emigrated to the United States in 1860. The young man was educated in Fordham University, New York City, and at St. Joseph's Seminary in Troy. Upon graduation from the latter, he journeyed to Rome for the rite of ordination (1870). Returning home, he was appointed secretary to Cardinal McCloskey, then went back to Rome as official to regulate Vatican ceremonies. In 1891 he was sent to New York as vicar-general, in 1902 was archbishop at New York, and in 1911 was made cardinal.

FARM BOARD, **FEDERAL**, a body created by the Agricultural Marketing Act, passed by Congress in June, 1929. Its members are appointed by the President, receive salaries of \$12,000 yearly, and are given wide discretion under the Act.

The main purpose of the board is to place agriculture on an equal basis with other in-

dustries. The means taken to this end include prevention of waste, a lessening of speculation, improving merchandising methods and encouraging cooperative organizations. Congress appropriated \$250,000,000 as a revolving fund from which the board is empowered to make loans. During the first year of its operation the board loaned over \$165,000,000. The board also cooperates with the Department of Agriculture in supplying information on marketing conditions.

When prices of farm products declined in 1930 and 1931 the Farm Board made large purchases in the attempt to stabilize conditions, and large quantities of this surplus—wheat and cotton—were disposed of to foreign buyers at prices below cost. 25,000,000 bushels of wheat were sold to Brazil in exchange for coffee.

FARM CREDITS. See RURAL CREDITS.

FARMERS' ALLIANCE. See POLITICAL PARTIES IN THE UNITED STATES.

FARM RELIEF, the general term for those measures and agencies designed to assist the farmers of the United States whose financial situation became hazardous in the later years of the world-wide depression. Chief among these was the Agricultural Adjustment Administration (AAA), authorized by Congress in 1933. This law conferred authority to organize farmers in limitation of production agreements, and probably no other measure affecting agriculture in the history of the nation produced controversy so violent. Under the provisions of this law production control programs were launched affecting corn, cotton, wheat, tobacco, and hogs, designed through greater scarcity to raise prices to producing farmers. The end sought was in a measure realized the first year, but resulted in increased prices to consumers and consequent unrest. A series of processing taxes—taxes upon the steps in manufacture—were levied to meet a part of the expense of farm benefits. On constitutional grounds the entire act was invalidated in 1936 by the Supreme Court.

Control of production and prices was not the only benefit to farmers. Debt relief was provided by the Farm Credit Administration (FCA), which refinanced more than 450,000 farm loans.

FARNE, fahrn, ISLANDS, or FERN, furn, ISLANDS, a group of seventeen small islands, two to five miles off the northeast coast of Northumberland, England. Some

of the islets are only visible at low tide and the largest, Farne, is only sixteen acres in extent. There are two lighthouses; one of them, on Long Stone Rock, was the scene of Grace Darling's heroism in 1838. See DARLING, GRACE.

FARNESE, fahr na'sa, an illustrious Italian family, which rose to prominence in the thirteenth century. The most conspicuous members were the following:

ALESSANDRO FARNESE, who became Pope Paul III in 1534; his grandson, ALESSANDRO (1547-1592), known as the Duke of Parma, who became a great general in the Spanish army and fought in the Netherlands; ELIZABETH FARNESE, wife of Philip V of Spain. The line became extinct in 1731.

Farnese Palace, one of the finest palaces in Rome, was erected by Pope Paul III (Alessandro Farnese). It was finished by Michaelangelo. The blocks of stone of which it is constructed were taken from the theater of Marcellus and from Colos. Most of the art treasures formerly contained in it are now at the Museum of Naples, but a few excellent works remain. The palace became the property of the ex-king of Naples, and is now the residence of the French ambassador to Italy.

Farnese Bull. This is a group of statuary dating from the second century B. C. It is based on the story of Antiope, a slave of Dirce. The latter ordered Antiope to be bound to the horns of a wild bull, and when the slave begged help from her two sons, they seized the cruel mistress and bound her to the horns. In the group the sons are depicted binding Dirce, while Antiope, in the background, looks on. The name of the statuary has reference to the fact that the group was for a time in the Farnese Palace. It is now in the Museum at Naples. The *Farnese Bull* is an example of the Rhodian school of sculpture, and it was excavated from the baths of Caracalla.

Farnese Hercules. This is a statue dating from the first century B. C. It, too, was excavated from the baths of Caracalla, and for a time was in the possession of the Farnese family. It is now in the Naples Museum. The statue, which depicts Hercules leaning on his club, represents the period of decline in Greek art.

FAROE, fa'ro, ISLANDS, a group of islands in the North Atlantic, lying between Iceland and the Shetlands. Including small

islets, there are twenty-five islands in the group, of which seventeen are inhabited. The total area is 540 square miles. The Faroes are mostly of volcanic rock and have steep coasts indented with deep inlets. They constitute a county of Denmark, and are under the jurisdiction of a governor appointed by the Danish king and a local assembly elected by the people themselves. The assembly elects one delegate to the Danish Parliament. The present inhabitants are descendants of Norsemen who colonized the islands in the ninth century and gave them their name, which is the Danish for *sheep*. The principal occupations are sheep raising, fishing, whaling and fowling, or the catching of wild birds for their flesh and feathers. The people, who are friendly and unworldly, cherish their old-time speech and customs. Thorshavn, on Strömö, is the capital. Population of the islands, 24,200.

FARRAGUT, DAVID GLASGOW (1801-1870), the most famous naval officer of the Civil War. He was the son of an American Revolutionary soldier, who died when the boy was eight years old. David was subsequently adopted by David Porter, a famous naval commander, and it is significant that the boy was appointed a midshipman in the navy at the age of nine and a half. Though only eleven when the War of 1812 broke out, he accompanied his foster-father on a cruise in the *Essex*, and within a year was made prize-master of a captured vessel.

During the Mexican War Farragut held various positions of importance and for the four years after 1854 was employed in founding the Mare Island Navy Yard, at San Francisco. In 1861 he was assigned to go with the expedition against New Orleans, undertaken on the formation of the Confederacy, and sailed in February of the following year. New Orleans surrendered to the combined attack of the land and naval forces in April, and Farragut, after taking possession of Baton Rouge and Natchez and running the batteries at Vicksburg, joined the Union fleet above. In consequence of his success at New Orleans he was promoted to the rank of rear-admiral. In 1863 Farragut passed the batteries at Port Hudson and was of the greatest assistance to the land forces in the attacks on Port Hudson and Vicksburg. In August, 1864, he attacked the Confederate fleet in the Bay of Mobile and forced it to surrender, thus making the fall

of Mobile inevitable. This naval victory was the crowning event of his career. For these achievements Congress created expressly for him the grades of vice-admiral (1864) and of admiral (1866).

FARRAR, FREDERICK WILLIAM (1831-1903), a writer, preacher and teacher, born at Bombay, India, and educated at the University of London and at Trinity College. In 1855 he was assistant master at Harrow and later was the head master of Marlborough College, which he made one of the first schools in England. He also served as chaplain of the House of Commons and was dean of Canterbury in 1895. He wrote many works of fiction, biography, philology and history. His *Life of Christ*, *Life of Saint Paul* and *The Eternal Hope* were written for the masses and were intended to raise religious thought to a higher plane.

FARRAR, fahr'rah', GERALDINE (1882-), an American grand opera star of wide popularity. She was born at Melrose, Mass., where she received her public school education. After studying music in Paris and Berlin, she appeared professionally in 1901 at the Berlin Royal Opera House in the rôle of Marguerite, beginning then a very successful career. Later she became a favorite with American audiences, gaining much admiration for her portrayal of the soprano rôles in *Carmen*, *Madame Butterfly*, *Manon* and *Tosca*. She was a gifted actress as well as a charming singer, and achieved success in a film production of *Carmen* and other motion pictures. Later she appeared in light opera and on the concert stage.

FARTHING, the smallest English coin, made of bronze, in value the fourth part of an English penny, or in United States and Canadian values, one-half cent.

FASCES, fas'seez, bundles of wooden rods (usually birch) which were carried by lictors before the Roman magistrates as a symbol of their power to punish by flogging. Except in certain cases an axe projected from the middle of the bundle, signifying power to inflict death. The number of fasces and lictors varied with the dignity of the magistrate.

FASCIISTI, fa'cheé'ste, the name of a militant organization in Italy, which came into prominence about 1920, and in 1922, under the leadership of Benito Mussolini, marched to Rome and forced the King to

accept Mussolini as Premier. Briefly, the doctrine of fascism (*fascismo* in Italian) has three underlying principles—nationalism, co-operation and the rights of property. The symbol of the Fascist is the *fascies* (see above), the old Roman symbol of strength in unity.

Fascism represents the very opposite of those principles that are indicated by the term *Communism*, the active principle of the Bolshevik rule in Soviet Russia. While its outstanding effort has been seen in Italy, its principles have attracted important groups in other countries, as a defense against communistic propaganda. The fascists oppose a free press and free speech and do not allow opposing political parties to function.

FASTS AND FASTING. The practice of going without food for definite periods is a very common religious observance. The Mohammedans fast between sunrise and sunset during their month Ramadan. A strict orthodox Jew fasts on the anniversary of a parent's death, on his birthdays after he is thirteen years of age, and on the birthdays of his first-born son till he is thirteen, besides observing the regular fast days. The Greek Church observes forty-eight days of fasting at Easter and thirty-nine at Christmas. Roman Catholics observe fasting rules during Lent and on certain fixed days.

Among the fast days appointed by Presidents of the United States were January 12, 1815; the last Thursday of September, 1861; April 30, 1863; the first Thursday in August, 1864; June 1, 1865; May 9, 1878; September 26, 1881.

The question of how long the body can endure total abstinence from food is an interesting one to scientists. Various warm-blooded animals are capable of living without food much longer than human beings. Cats and dogs have survived for several weeks without nourishment of any kind, and hibernating animals have lived several months, but it is probable that few human beings could survive such deprivation for more than a week. Death usually ensues after the fifth or sixth day, especially if there is a loss of four-tenths of the weight of the body. A person deprived of food but having access to water can ward off starvation for a much longer period.

FAT is found in all parts of the body except the teeth, bones and fibrous tissue. It is abundant in milk, in the marrow of

bones and around various internal organs. It gives the human frame its smooth, rounded outline, and, since it does not readily conduct heat, is useful in retaining warmth. Fat aids the movements of certain organs, as the eye, the orbit of which is lined with this substance. The quantity of fat varies at different periods of life, being most abundant in the young and in middle life. As an article of diet fat is very important, and if the human body is deprived of it a weakened condition results. See **FOOD**.

There are three classes of fats—hard, soft and liquid—represented respectively by (1) wax and human fat, (2) lard and butter and (3) oils.

FATALISM, the belief in fate, or an unchangeable destiny, to which everything is subject, and by which every act is predetermined. It must be distinguished from *determinism*, a doctrine fundamentally antagonistic. The determinist believes in the power of will to determine events; the fatalist does not accept the doctrine of free will.

FATA MORGANA, *fah'tah mor gah'nah*, the name of a peculiar mirage, occasionally seen in the Strait of Messina. The images of men, houses, towers, palaces, columns, trees and other objects are occasionally seen from the coast, sometimes in the water, sometimes in the air and often at the surface of the water. The same object has frequently two images, one in the natural and the other in an inverted position. The name means *fairy Morgana*, a fairy who was supposed by the ancients to cause the illusion. See **MIRAGE**.

FATES, or **PARCAE**, in Greek and Latin mythology, the three sisters who spin the thread of human life. The name *Clotho*, which means *the spinner*, probably belonged



THE THREE FATES

originally to all three, but as poets attempted to describe more precisely the function of each, separate names were assigned to them—

Clotho, Lachesis and Atropos. Clotho spun the thread of life; Lachesis decided its fate, and Atropos with her great shears cut the thread.

FATHER, a title of reverence which has been bestowed upon several men of history who have been regarded in a sense as creators, or who have been severally associated with the beginnings of great movements. The following is a list of the important men who have been given this distinction:

Father of Angling. Izaak Walton, author of the *Compleat Angler*.

Father of Comedy. Aristophanes, the greatest of the Greek writers of comedy.

Father of English History. Bede, author of an *Ecclesiastical History of the English People*.

Father of English Poetry. Geoffrey Chaucer, whose *Canterbury Tales* gave English verse a standard literary form.

Father of Epic Poetry, a name commonly given to Homer.

Father of Greek Tragedy. Aeschylus, the first great writer of Greek tragedy.

Father of His Country. George Washington is the "Father of his Country" to Americans.

Father of History, a title given to Herodotus, the Greek historian.

Father of Medicine, a name given to Hippocrates.

Father of the Faithful, Abraham, the ancestor of the Jewish nation.

Father is sometimes used figuratively, as in the expression.

Father of Waters, applied to the Mississippi River. **Father of Lies** is a title given to Satan.

FATHER-LASHER, *fah'thur lash'er*, a fish from eight to ten inches in length, belonging to the sculpin genus (see *SCULPIN*). The head is large and is armed with several formidable spines. The fish is found on the rocky coasts of Britain and near Newfoundland and Greenland. In the latter regions it attains a large size and is a common article of food.

FATH'OM, a nautical term, first used in England, meaning six feet. The use of the word is restricted to measurement of the depth of water in the sea.

FATIGUE, *fa teeg'*, a depressed condition of mind or body following prolonged labor. The symptoms are familiar. Everyone knows what it means to be tired, and many have experienced the extreme of weariness—complete exhaustion. Fatigue may be felt in one part of the body, as the eye or muscles of the arm, or it may be felt generally.

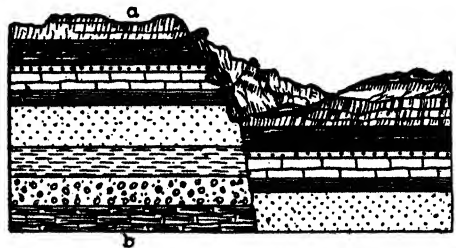
The causes and effects of fatigue have en-

gaged the serious interest of psychologists and physiologists. It is believed that the direct cause of physical fatigue is the accumulation in the body of poisonous waste matter which the muscles throw off while they are active. If the waste material collects faster than the blood can carry it away fatigue results. Anaemic and ill-nourished persons become tired easily because their blood is devitalized and unable to carry on its functions normally.

It is probable that the explanation for physical fatigue holds good for mental weariness, except that the brain seems to be able to stand intensive labor longer than the muscles. While the sensation of weariness is usually a safeguard, warning the individual not to drive his mind or body too hard, it is wise to avoid unnecessary fatigue. The man who is moderate in whatever he does, and who insists upon an adequate amount of rest and sleep, will reduce his periods of fatigue to a minimum and conserve his health.

FATTY DEGENERATION, *de jen ur a' shun*, a condition found in the tissues of the body, in which the health protoplasm is replaced by fatty granules. It is a sign of defective nutrition and is common in old age, affecting the muscles, the heart, the arteries, the kidneys and other organs. It is accompanied by great muscular flabbiness and want of energy, although the sufferer may appear fleshy and comparatively well.

FAULT, *fawlt*, wherever in the rock crust of the earth a deep crack has occurred from the surface downward the rock layers or strata have been displaced. The displacement along the plane of such a fracture is called a fault. The section *ab* in the illus-



A FAULT

tration shows the strata in their original position, while the section to the right shows the sinking which caused the fault. Faults are frequently met with in coal beds, the miner often coming unexpectedly upon an abrupt wall of other strata. The angle this makes

with the plane of the bed he is working indicates whether he must look up or down for its continuation on the other side of the fracture. In mines faults often serve as natural drains.

FAUNA, *faw'nah*, a term used to designate the animal life of geographical areas or geological ages, as the word *flora* is used to designate plant life. Sometimes the region considered is small, sometimes very large; for instance, one may speak of the fauna of Cape Cod or of the fauna of North America.

FAUNS, rural deities or demigods, who, the Romans believed, inhabited the forests and groves. They resembled the satyrs and were said to have pointed ears, short horns, goat's tails and sometimes even cloven feet. In later times the fauns were considered to be more nearly human and were sometimes related to the animal world merely by pointed ears or horns. In the novel *The Marble Faun* Hawthorne brings into the story a famous marble statue of a faun in the Capitoline Museum at Rome.

FAURE, *fawr* FRANÇOIS FELIX (1841-1899), a French statesman, President of the French republic from 1895 to 1899. He took an active part in the Franco-Prussian War, and for his gallant services was decorated with the ribbon of the Legion of Honor. He became a member of the Chamber of Deputies in 1881 and later was under-secretary of state. On the resignation of Casimir-Perier in 1895, Faure was elected President. His administration was safe and conservative, but not brilliant.

FAUST, *fowst*, JOHANN (about 1485-about 1540), a German astrologer whose name has been connected with a well-known medieval legend. This story has been made immortal by Goethe's great drama *Faust*, and by the opera of the same name, composed by Gounod. The English dramatist Christopher Marlowe also made use of it.

According to the original story, Faust in his sixteenth year went to Ingolstadt and studied theology, attaining great distinction, but abandoned theology and began the study of medicine, astrology and magic, in which he likewise instructed his companion Wagner, the son of a clergyman at Wasserburg. After Faust had spent a rich inheritance, he made use of his power to conjure up spirits and entered into a contract with the devil for twenty-four years. A spirit called

Mephistopheles was given him as a servant, with whom he traveled about, enjoying life in all its forms, but the evil spirit finally carried him off.

In the opera *Faust* is represented as an old man who sells his soul to the devil, receiving as a reward youth and beauty. He is tempted to make this bargain by a vision of the lovely Marguerite, whom he afterwards pursues to her ruin. At the close, Marguerite is carried to heaven while Faust is dragged to the lower regions by Mephistopheles.

FAUST, or **FUST**, JOHANN (?-about 1466), a German printer, the partner of Gutenberg, the inventor of printing with movable type. There are extant certain works which were published in the printing shop of Faust. The most famous publications which came from his press are the so-called Mazarin Bible and a psalter with beautifully illuminated initials, the first book published with complete dates. See PRINTING; GUTENBERG, JOHANNES.

FAWKES, *fawks*, GUY (1570-1606), an English conspirator. See GUNPOWDER PLOT.

FEASTS. See FESTIVALS.

FEATHERS, outgrowths from the skin of birds, which provide them with a covering that is both useful and attractive. A feather consists of a *quill* and a *shaft*. The quill is the lower part of the feather, and is a strong, round, horny stem. The upper part, or shaft, is filled with pith. On each side of the shaft is a web, composed of a series of regularly arranged fibers, called *barbs*. The barbs and shaft constitute the *vane*. On the edges of the barbs are set the *barbules*, which interlock with those of adjacent barbs and thus give strength to the vane. Feathers are generally divided into two kinds, *quill feathers*, found in the wing or tail, and *plumes*, or *clothing feathers*, generally distributed over the body.

The feathers of birds are periodically changed, generally once, but in some species twice, a year. This is called *molting*. When feathers have reached their full growth, they become dry, and only the tube, or the substance which it contains, continues to absorb moisture or fat. When, therefore, part of a feather is cut off, it does not grow out again; and a bird whose wings have been clipped remains in that situation till the next molting season, when the old stumps are shed and new feathers grow out.

The feathers of birds of beautiful plumage, such as birds of paradise, pheasants and egrets, have long been a valuable commodity of the milliner's trade, but public opinion is tending to restrict the slaughter of these birds for commercial purposes. It is illegal to import such feathers into the United States. Ostrich plumes (see OSTRICH) are very popular in some seasons, and there is no objection to their use, as the birds are not harmed when their plumes are removed. Feathers of domestic fowls are used as stuffing for bedticks, quilts and cushions.

FEBRUARY, the second month in the year. It has twenty-eight days, except in leap year (which see), when it has twenty-nine. In the old Roman calendar February had thirty days, but when Caesar added one day to July, the month named for him, he took one day from February, and it lost an additional day when Augustus added a day to August, his honor month. Its gem is the amethyst, and its special flower the primrose.

Special Days for Observance. Besides the notable birthdays occurring in February (see below), there is a special day of festivity, the fourteenth, called *Saint Valentine's Day* (see VALENTINE, SAINT). *Candlemas Day*, which falls on the second, is a Roman Catholic festival (see CANDLEMAS).

Anniversaries for Celebration. The following birthdays are worthy of observance:

Horace Greeley, February 3, 1811.
 Sidney Lanier, February 3, 1842.
 Zebulon M. Pike, February 5, 1779.
 Dwight L. Moody, February 5, 1837.
 Millard Fillmore, February 7, 1800.
 Charles Dickens, February 7, 1812.
 William T. Sherman, February 8, 1820.
 Jules Verne, February 8, 1828.
 William Henry Harrison, February 9, 1773.
 John A. Logan, February 9, 1826.
 Charles Lamb, February 10, 1775.
 Thomas A. Edison, February 11, 1847.
 Peter Cooper, February 12, 1791.
 Abraham Lincoln, February 12, 1809.
 Charles Darwin, February 12, 1809.
 Winfield S. Hancock, February 14, 1824.
 Galileo, February 15, 1564.
 Susan B. Anthony, February 15, 1820.
 Elihu Root, February 15, 1845.
 Copernicus, February 19, 1473.
 David Garrick, February 19, 1717.
 William H. Prescott, February 20, 1726.
 Joseph Jefferson, February 20, 1829.
 George Washington, February 22, 1732.
 James Russell Lowell, February 22, 1819.
 Victor Hugo, February 26, 1802.
 Henry W. Longfellow, February 27, 1807.
 Raphael, February 28, 1483.

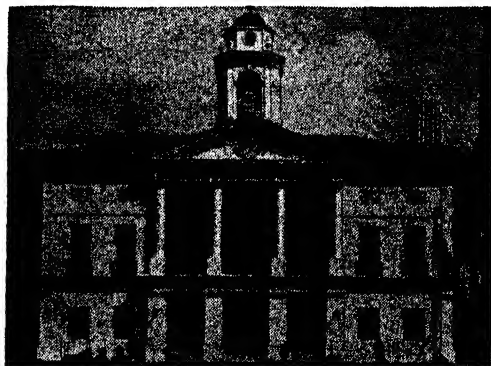
The following notable events occurred in February:

Meeting of the first Parliament of Great Britain and Ireland, February 2, 1801.
 Victoria Cross instituted, February 5, 1856.
 German National Assembly began sessions in Weimar, February 6, 1819.
 Jefferson Davis chosen President of the Confederate States, February 9, 1861.
 Marriage of Queen Victoria and Prince Albert, February 10, 1840.
 Upper and Lower Canada reunited, February 10, 1840.
 Spanish-American War closed by treaty, February 10, 1899.
 Maine blown up in harbor of Havana, February 15, 1898.
 Suez Canal first opened to ships, February 17, 1867.
 Inauguration of Jefferson Davis, February 18, 1861.
 Dedication of Washington Monument, February 21, 1885.

FEDERAL BUREAU OF INVESTIGATION. See SECRET SERVICE.

FEDERAL FARM BOARD. See FARM BOARD, FEDERAL.

FEDERAL HALL, the building in which the first national Congress met in New York City and in which Washington was first inaugurated. The building was erected as a city hall in 1699, and was remodeled for the



FEDERAL HALL, A REPRODUCTION
 use of the national government. Federal Hall was torn down in 1836, and a sub-treasury was erected on its site.

FEDERALIST, THE, a collection of eighty-five essays favoring the adoption of the Constitution of the United States, written by Alexander Hamilton, John Jay and James Madison and published by them in newspapers in 1788, over the signature *Publius*. *The Federalist* has been called "the political classic of the United States," and

is considered the most important commentary on the Constitution. The historian John Fiske says that this series of papers had more to do with convincing the people of the wisdom of adopting the Constitution than any other single factor except Washington's influence.

FEDERAL PARTY, or FEDERALISTS, a name assumed by that party in the United States which favored the adoption of the Federal Constitution and sought to increase the powers of the national government, opposing the theory that the states should be given wider powers. They advocated a strong central government, operating upon the people directly. They came into power in 1789 with the election of Washington to the Presidency, but were defeated in 1801 and went out of existence about 1817. The Federal party was the forerunner of the National Republican, Whig and present Republican parties. See **POLITICAL PARTIES IN THE UNITED STATES**.

FEDERAL RESERVE BANKS AND BOARD. See **BANKS AND BANKING**.

FEDERAL TRADE COMMISSION, a United States government commission of five members, appointed by the President and confirmed by the Senate. It was organized in 1914. Under the act of Congress it was authorized to take over the Bureau of Corporations.

The Commission was formed primarily for the purpose of discouraging monopoly, ordering the discontinuance of unfair practices, and preserving competition among business interests of the United States. It is responsible for the enforcement of anti-trust legislation, is expected to advise Congress of any insufficiency in such legislation and suggest remedies through new laws. The Commission was not clothed with judicial powers to enforce its decrees. It may issue "cease and desist" orders when unfair business practices are discovered, but must seek the sanction of a Federal court to make them effective. The powers of the Commission do not extend to banks, railroads, or other agencies subject to regulatory authority by other branches of the government.

FEDERATED MALAY STATES, four Mohammedan states occupying the greater part of the Malay Peninsula. They are Perak, Selangor, Negri Sembilan and Pahang, and are under British protection. The officers administering the government of

the Straits Settlements is *ex officio* High Commissioner for these states, but in each state the supreme authority is vested in the state council, which is presided over by the native sultan, who is assisted by the British resident. In 1909 the four native rulers entered into an agreement with the British governor of the Straits Settlements by which a federal council was created to consider matters of interest to all the states. This council meets once a year. The area and population of each of the four states is shown in the following table:

STATES	SQ. MILES	POP. 1931	HEADQUARTERS
Perak.....	7,800	755,989	Taiping*
Selangor.....	3,156	533,197	Kuala Lumpur
Negri Sembilan.....	2,550	233,799	Seremban
Pahang.....	14,000	180,111	Kuala Lipis†
The Federation...	27,506	1,713,096	Kuala Lumpur

*The native capital is Kuala Kangsar.

†The native capital is Pekan.

The Federated Malay States are a source of coconuts, rice, rubber, sugar, tapioca and pepper. Timber, oils, resins, gutta percha and canes are important forest products. The cultivation of rubber and the mining of tin are the chief industries; from these states comes over half the world's supply of tin. Schools and hospitals have been established, there is postal, telephone and telegraph service, and railway construction is proceeding vigorously.

FEEBLE-MINDED, EDUCATION OF THE. Those unfortunate beings whose mentality is below normal need special training to prevent their being too great a burden to society and to themselves. Schools which care for mental defectives are found in all enlightened countries, and in the United States thirty-seven states have established such institutions. There are over 100 public day schools for the education of defectives, and about twenty-eight private schools. Altogether there are in the United States about 50,000 pupils being cared for in special schools for the feeble-minded. Similar institutions are found in the Canadian provinces.

In working out a plan of instruction for mental defectives, educators have to recognize that there are degrees of feeble-mindedness. The lowest class includes idiots, who are wholly lacking in the power of attention and self-control. The next class, the simple idiots, includes those whose minds never advance beyond the intellect of the seven-year-

old child. Lastly come the imbeciles, who, though they are weak-willed and backward in many ways, can be taught to do useful work. None of the imbeciles has a mentality beyond that of the twelve-year-old.

The methods of instruction are similar to those employed in the best kindergartens and primary schools. The brightest of the pupils learn to read and write, and a few are capable of learning number as far as multiplication. However, the most beneficial work is of an industrial nature. The girls are taught all lines of housework and also fancy needlework, knitting, crocheting and embroidery. General exercises in music, calisthenics and military drill are used for the purpose of assisting the pupils to control their muscular movements and to work in harmony. The greatest patience on the part of the teachers is necessary, and those engaged in the work usually have special aptitude for it and devote their lives to it.

FEELING, the emotional element in consciousness. Feeling accompanies all mental acts and constitutes the personal element in them. It is the internal side of all mental activity and that which enables us to join the self to the outside world. It is through feeling that we recognize selfhood, or the difference between you and me. We can understand feeling only through experience. Unless a person has felt joy and sorrow, pleasure and pain, all the literature ever written upon these subjects could not make him understand them. Because feeling is such a strong personal element in mental activity, it is difficult to define, and nearly all definitions are vague and unsatisfactory.

Classification of Feelings. Feelings are divided into two classes, sensuous and ideal, or formal.

Sensuous Feelings. Sensuous feelings are those arising from certain physical conditions. They are often divided into two divisions, those arising from the general senses, such as hunger, thirst and fatigue, and known as organic, and those arising from the organs of special sense, such as the pleasure derived from viewing a beautiful picture or hearing a sweet melody, and called special. These feelings must not be confounded with sensations. Sensations furnish the stimuli which arouse the mind to action. We locate the sensation in the object which produces it. Feeling is in the self. I locate the tone of the piano in the instrument, not in the ear; but if I burn my hand on a hot iron, I locate the pain in the hand, and not in the iron.

Ideal, or Formal Feelings. Ideal, or formal, feelings are those which arise from mental

states. In their highest form they are complex, specific, and exercised towards a special object, as admiration for a picture, love for one's parents. They are of two classes, egoistic and altruistic. The egoistic feelings are those which center within the self, and for this reason are often termed selfish. They should not, however, be confused with selfishness, as that term is ordinarily used. Selfishness means the advancement of the self without regard to the rights of others, but proper self-interests, such as self-respect and desire to improve, are essential to all other interests, and egoistic feelings of this sort are necessary to the right development of character. Altruistic feelings are directed towards objects outside the self, and when highly specialized and complex are termed emotions.

Quality of Feeling. Feelings are either pleasurable or painful. These qualities are intimately associated with the condition of the nervous system. Pleasure results from working off a surplus of nervous force and energy; children enjoy running and other muscular exercises for this reason. One also enjoys quietude after severe exercise.

Pleasure may be turned into pain. Exercise which in the beginning is enjoyable becomes painful after the system is fatigued. Even the sweetest music grows tiresome if persisted in too long. Pain may likewise be turned to pleasure. A review of one's experience will reveal the fact that many of the pleasures most enjoyed in adult life are results of what in the beginning were painful practices. Such as skating, riding a bicycle and performing other acts which were learned by effort so strenuous that it was often painful. Many people acquire a fondness for clams, oysters, olives and other articles of food by practice in eating them. When first eaten, these were usually far from enjoyable.

Intensity of Feeling. The intensity of feeling is affected by:

(1) The amount of stimulus. The burn from a red-hot iron is more painful than the sting of a mosquito.

(2) By the prolongation of the stimulus. The effect of a stimulus, which at first produces a keen sense of feeling, by long continuation is perceptibly diminished. Similar effects are produced upon mental states. Continual fault-finding, scolding or praise becomes tiresome and after a time has no effect upon those subjected to it.

(3) By change of stimulus. The feelings are intensified by changing the stimulus so as to excite one set of sensitive organs and then another.

The above principles apply almost en-

tirely to sensual feelings. The intensity of ideal feelings depends largely upon the reverse of these principles. Usually, the longer we dwell upon an idea, the deeper the feelings to which it gives rise. One's love for one's parents, resentment of an insult or interest in a subject grows stronger the more one dwells upon the ideas which give rise to the feeling. Ideal feelings are often vivified by the imagination and are easily recalled by the memory, but they are in the last analysis dependent upon the sensuous feelings for their origin, as one's love for his mother or friends originates in the pleasure derived from their ministrations.

Culture of Feelings. The proper culture of the feelings is essential to one's development of a right character and to one's happiness. The child can be assisted in the cultivation of his feelings if those who have charge of his education will give heed to the following principles:

(1) During childhood feelings are narrowly egoistic and very intense. Their activity is not subject to the control of the will nor guarded by reason.

(2) Feelings strengthen with use. When one gives way to anger once, it is easier for him to do so again. Likewise, every time one controls his feelings under trying circumstances, he acquires increased power of self-control. Children should be led to acquire the power of self-control early. They should never be subjected to teasing or otherwise unnecessarily irritated. Such treatment often results in the formation of mental habits which are a hindrance through life.

(3) The intellectual feelings arise from the egoistic. The child's first desire for knowledge is aroused by what he sees others doing, for he wishes to possess the power which will enable him to accomplish the same results. If wisely led in fulfilling this desire, he gradually acquires a love of knowledge for its own sake, and study becomes a pleasure.

(4) The acquisition of knowledge is most satisfactory when the act is accompanied by feeling of a low degree of intensity. Strong emotion prevents careful reasoning; hence, the arousing of undue excitement under the name of enthusiasm is injurious to the work of the school and will seldom, if ever, be resorted to by a judicious teacher.

(5) The esthetic feeling, or love for the beautiful, is an important factor in the development of character and should receive early attention.

(6) The moral sentiment should be trained along with the intellectual and the esthetic. This is accomplished most successfully through concrete illustrations which appeal to the child's love and sympathy, such as fables and tales.

(7) The imagination and the feelings are

very closely related. The child's imaginary joys or sorrows may be made to appear stronger than the realities.

(8) Happiness is the natural state of life, and nearly all our struggle is for the purpose of gaining happiness. The school and the home should be places of enjoyment, but the most thorough enjoyment is obtained through the wise and healthy use of all the child's powers. The school and home which give this sort of enjoyment contribute most to the child's welfare.

Related Articles. Consult the following titles for additional information:

Emotions	Psychology
Imagination	Sensation
Methods of Teaching	Will

FEE SIMPLE. A *fee*, in law, is an estate or inheritance in land; this is also the definition of fee simple, with the added significance that a fee simple is an estate belonging to a man and his heirs absolutely, to keep or to dispose of as they choose, without restrictions. It differs from a *fee tail*, which is an estate which can descend to "heirs of the body" only, or blood-relations. The latter is practically unknown in America.

FELDSPAR, *feld'spar*, one of the most common minerals. It is a compound of silica and aluminum, in combination with soda, lime, or potash; thus there is a soda feldspar, lime feldspar and potash feldspar. Of the fifteen or more varieties, potash feldspar is the most common; it is called *orthoclase*. Another variety, called *labradorite*, contains beautiful blue crystals. The variety called *anorthite* is pink; *microcline* is green, and *albite*, white. One variety is called *moonstone*, because of its pale luster. It is feldspar which gives granite its peculiar color when polished.

In some form or other feldspar constitutes the principal part of all igneous and metamorphic rocks (see IGNEOUS ROCKS; METAMORPHIC ROCKS), such as granite, gneiss, porphyry and greenstone. It is not quite so hard as quartz. See GRANITE.

FELLAH, an Arabian word meaning *peasant*, used to designate any one of the laboring class in Egypt. The fellahs, or *fellahin*, constitute about three-fourths of the population of Egypt and are mostly the direct descendants of the old Egyptians, although both their language and religion are now that of their Arabian conquerors. They live in rude huts by the banks of the Nile and have suffered much from overtaxation and oppressive rule. Under modern rule their condition is gradually improving.

FELLOWSHIP. In some universities graduate students of limited means yet of marked proficiency are allowed an annual sum of money to enable them to continue their studies. Most of the money which forms this foundation, or fellowship, comes from personal gifts or bequests, or is appropriated from the university funds.

In America the average amount given to a student is \$500 a year. Fellowships in English colleges commonly range in value from about \$750 to \$1,500 a year, and they all confer upon their holders the right to apartments in the college and certain privileges as to commons, or meals. Fellowships are held for six or seven years, though the term may be prolonged in certain circumstances. Fellowships in the United States are usually for one year, though the student may be reëlected.

FEL'ONY, an offense punishable either by death or by imprisonment in a prison or reformatory. It is so defined in state statutes, though there is no definition of the word in the Federal laws. In general, whatever is a felony under the English common law is a felony in the United States. See **CRIME**.

FELT, a kind of cloth made of wool or of wool and fur matted together, with the aid of moisture and heat, by rolling, beating and pressure. The materials to be felted are carded, are placed in a machine where they are kept moist and are mixed together by a process of beating. They are then passed between rollers, subjected to pressure and united into a compact mass. Feltmaking is supposed to have originated in Western Asia, and the best qualities are still made in Persia and neighboring countries. Felt is now in general use for hats, clothing, upholstering, carpets and many other articles. Because of its being a nonconductor of heat, it is much used for roofing, sheathing hot-water reservoirs and the like.

FE'MUR, the long bone that forms the skeleton of the thigh. See **SKELETON**.

FENCING, *fens'ing*, the art of handling a sword or rapier for attack or defense, or an imitation of it, practiced with foils for sport. The practice is an old one, for it became common in Italy in the sixteenth century. In France, in the time of Louis XIII, killing by this means was a favorite pastime of the nobility. The small sword, or rapier, adopted for dueling, had a point but no edge, and demanded the highest de-

gree for adroitness in its use. Dueling as a means of settling disputes lasted for centuries, but to-day duels are rare.

Fencing with light weight swords is a favorite form of exercise in gymnasiums. It promotes agility, develops muscular control and gives to the fencer a good bodily poise. In the fencing schools the instrument adopted for exercise is called a foil; it has a guard of metal or leather between the handle and the blade, which is made of pliant steel and has a rubber button at the end in place of a point.

FENELON, *fan'lohN'*, FRANÇOIS DE SALIGNAC (1651-1715), an eminent French educator, born in the Province of Perigord and educated at Plessis College, Paris and at the Seminary of Saint Sulpice. In 1678 he was placed at the head of a school founded to protect and to convert to Catholicism the orphan daughters of Huguenots. This led him to give special attention to the education of women and to write a treatise on *The Education of Girls*, which was the first systematic work of its kind ever prepared. It was a plea for the general education of women, particularly in the subjects and arts which should fit them for the home and other spheres that women at that time were expected to fill. Fenelon believed that only as women are educated could the moral and educational standard of the community be raised. He therefore considered the education of girls as essential as that of boys. Of his writings the most important are *The Adventures of Telemachus*, a sort of romance narrating the wanderings of Ulysses' son; *Maxims of the Saints*, *The Temporal Power of the Medieval Popes*, and *The Education of Girls*.

FENIANS, an organization of Irish-Americans, founded in 1861 for the purpose of aiding in the forcible separation of Ireland from England. Their most important organ, the *Irish People*, which was published in Ireland, was seized by the British government in 1865, and many leaders of the movement were arrested; but in the same year a convention at New York determined to establish an independent government in America. This led to an armed movement which resulted in several attacks on the Canadian frontier in 1866 and an incipient rebellion in Ireland in the following year. Later efforts to secure better conditions for Ireland are related in the article **HOME RULE**.

FENNEL, a fragrant plant of the parsley family, cultivated in gardens. It bears umbels of small, yellow flowers and has finely divided leaves, which give off a pleasant odor. The fruit, or in common language, the seed, is frequently employed in medicine, and the leaves are sometimes used to season sauces.

FERBER, EDNA (1887-), American novelist and short story writer, was born in Kalamazoo, Mich., and received a high school education in Appleton, Wis. At 17 she began her literary career as reporter on a local paper, later with the *Milwaukee Journal* and the *Chicago Tribune*. Several short stories from her pen brought her into prominence. Her interesting pictures of everyday life gave her subsequent novels great popular approval. Among her best known books are *Dawn O'Hara*, *Roast Beef Medium*, *Personality Plus*, *Emma McChesney & Co.*, *Fanny Herself*, *Cheerful—By Request*, *The Girls*, *Gigolo*, *So Big*, *Show Boat*, *Mother Knows Best*, *Cimarron*, and *American Beauty*. She was co-author of the comedies *Our Mrs. McChesney*, *Minick*, and *The Royal Family*.

FER-DE-LANCE, *fair de lahn's*, a venomous snake of tropical America, one of the most terrible members of the rattlesnake family. It reaches a length of seven feet and is of a reddish-yellow brown, marked with a black stripe from eye to neck and dark cross bands on the body. The tail ends in a horny spine which the viper scrapes harshly against rough objects, but it does not rattle. Its bite is usually fatal.

FERDINAND I (1861-1927), King of Bulgaria from 1909 to 1918, was born in Vienna, son of Prince Augustus of Saxe-Coburg and Princess Clementine of Bourbon-Orleans. While serving in the Austrian army he was offered the vacant throne of Bulgaria, and in 1887 he accepted and took the title of Prince. In 1908 he assumed the title of King and in 1909 was so recognized by the powers. Ferdinand favored the formation of the Balkan League and the prosecution of the Balkan War of 1912-13. Territorial quarrels with his allies brought reverses, and the king lost prestige both at home and abroad.

During the first year of the World War (which see) Ferdinand maintained neutrality, but in 1915 he cast the lot of Bulgaria with the Germanic powers. When, in 1918, Bulgaria had to capitulate to the allied powers, he abdicated in favor of his son, Boris, and

retired to Coburg. See BULGARIA, subhead HISTORY.

FERDINAND I (1503-1564), Holy Roman emperor, brother of Charles V of Germany, from whom he received, soon after Charles's accession as emperor, the hereditary possessions of the Hapsburgs in Austria. For many years he was chiefly occupied with a war with the Turks, who supported as king of Hungary John Zápolya of Transylvania. When Charles V abdicated the imperial throne in 1556, Ferdinand succeeded him. His rule was wise and enlightened.

FERDINAND II (1578-1637), Holy Roman emperor, grandson of Ferdinand I. He became duke of Styria, Carinthia and Carniola in 1590 and showed at once a determination to uproot Protestantism from his dominions. This well-known aversion to the Protestant faith was the cause of determined protest from the Protestants of Bohemia, when in 1617 Ferdinand was crowned king of that country (see AUSTRIA-HUNGARY). The result of this opposition to Ferdinand was the outbreak of the Thirty Years' War. In 1619, after the death of Matthias, Ferdinand was made emperor. He died before the Thirty Years' War was concluded.

FERDINAND II (1810-1859), king of the Two Sicilies, succeeded his father Francis I in 1830. The revolution in France in that year had unsettled the minds of men throughout the Continent, and Ferdinand was at first forced to make some concessions to his subjects, but soon recalled these, determining henceforward to make his will the only law. The result was a series of outbreaks, culminating in the year 1848, when Ferdinand earned the nickname of King Bomba, from his bombardment of Messina. Despotism was again established by force of arms, and when Ferdinand died his prisons were crowded with the best and bravest of his subjects.

FERDINAND IV of Naples, known, also, as Ferdinand I of the Two Sicilies (1751-1825), was the third son of Charles III, king of Spain, whom he succeeded in 1759 on the throne of Naples, on the accession of Charles to the throne of Spain. After the death of Louis XVI Ferdinand joined the coalition against France and took part in the general war from 1793 to 1796; but in 1799, after the defeat of the Neapolitans under General Mack, the French took possession of the

whole kingdom and proclaimed a republic. The new republic did not last long, but six years later Ferdinand was again driven from Naples by the French. After the downfall of Napoleon he once more came to power and took the title of Ferdinand I, king of the Two Sicilies. In 1820, in consequence of a revolution, Ferdinand was obliged to swear to support a new and more liberal constitution. The Austrians, however, came to his help and reestablished him in possession of absolute power.

FERDINAND V (1452-1516), king of Aragon, who received from the Pope the title of *the Catholic*, on account of the expulsion of the Moors from Spain, was the son of King John II. This was the Ferdinand who touches earliest American history through his marriage. In 1469 he married Isabella of Castile. This brought about that close connection between Aragon and Castile which became the basis of a united Spanish monarchy and raised Spain to preëminence among European states. After a bloody war of ten years Ferdinand and Isabella conquered Granada from the Moors (1491). The most brilliant event of their reign was the discovery of America, which made them sovereigns of a new world, through Isabella's faith in the designs of Christopher Columbus.

FERMENTATION, a general term for certain changes which result from the action of bacteria, by which organic substances are converted into new compounds. Fermentation takes place when food is digested, for the work of the gastric juice in softening the albumin in food is due to the activity of a ferment called pepsin. Other ferments, of a harmful nature, are at work when the food turns sour and brings on an attack of indigestion. The decaying of foods not properly protected and the action of yeast in bread dough are examples of fermentation familiar in the household. When milk turns sour it does so because the sugar in the milk is converted into lactic acid by fermentation.

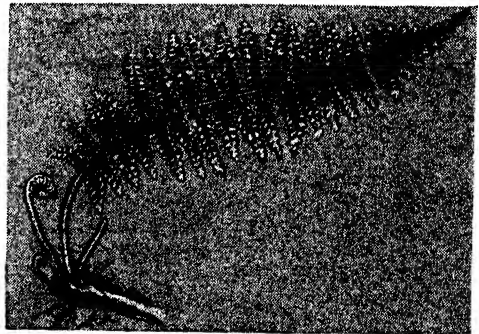
From an industrial point of view the most important kind of fermentation is that in which there is a conversion of sugar into alcohol. The general course of alcoholic fermentation, as seen in brewing and in winemaking, is as follows: After a lapse of time, which may vary much according to temperature and other conditions, the liquid becomes cloudy and gas bubbles arise, increasing in frequency until the liquid begins

to effervesce. The temperature of the liquid rises to a higher degree than that of the surrounding air, and on its surface appears a frothy matter known as *yeast*. After a time the climax is passed, the effervescence diminishes and the yeast settles down at the bottom of the liquor, which is now entirely deprived of its sugar and has the characteristic taste and effects of fermented liquors, (which see).

FERMENTED LIQUORS, alcoholic beverages, obtained by the fermentation and clarification of fluids containing sugar. Among the commonest kinds are *wine*, made from the juice of the grape; *ale*, or *beer*, made from an infusion of malt; *cider*, made from apples; *mead*, made from honey; *kumiss*, made by the Kirghiz from mares' milk, and *chica*, made from maize by the South American Indians. From all fermented liquors a spirit may be extracted by distillation. See **FERMENTATION**.

FERN ISLANDS. See **FARNE ISLANDS**.

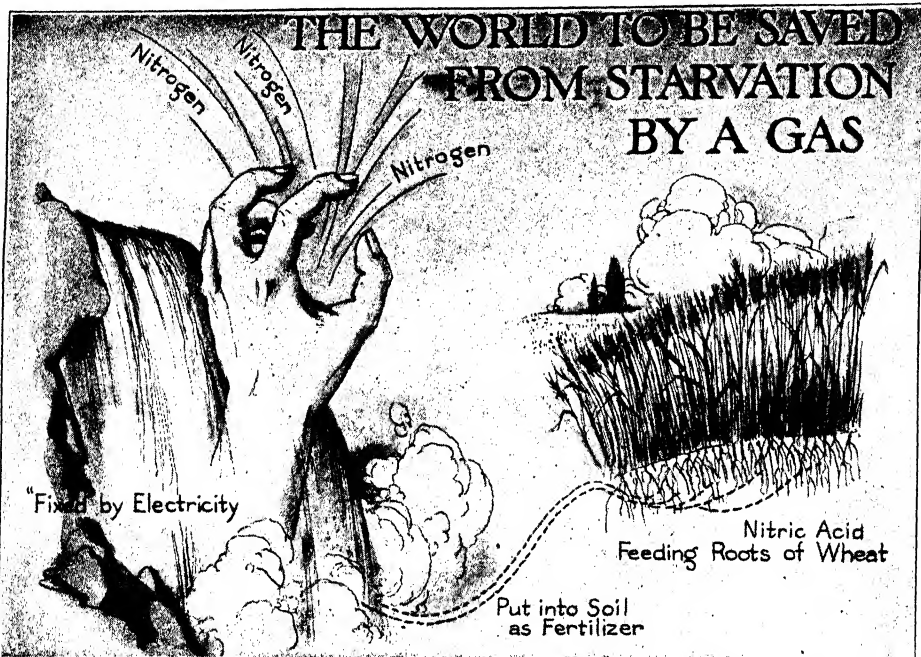
FERNS, the largest and most important family of the cryptogams, or flowerless plants. They put forth leaves, or, more properly, fronds, from a rootstock or from a hollow, treelike trunk. The fronds, as they appear



FERN

from the ground, are rolled up at the tip, so that they have somewhat the appearance of a bishop's crozier. There are probably not less than 4,500 species of ferns, many of which live in the temperate regions, but the greatest number are found in the tropics, where heat and moisture encourage them to remarkable growth. In the tropical forests the tree ferns rival palms, rising sometimes to a height of fifty feet and bearing crests of fronds twenty feet in length.

Most ferns grow in the earth, but some are aquatic, and many of the tropical species are



"There's no danger of a world famine!" you say. "And if there were, people can't live on GAS!" There IS danger of famine because the population is increasing faster than the food supply. "But can't the earth be made to yield more food?" That's just what the "gas" is to do! Nitrogen from the air, put into the soil as fertilizer, will increase the yield of wheat three or four times, and will make it profitable to put thousands of acres more into wheat growing.



Courtesy American Cyanamid Co.

The greatest and cheapest power (Niagara), the greatest heat, 7,000° F. (electric furnace), and the greatest cold, 300° F. (liquid air), in combination, make it possible to "fix" the free nitrogen of the air for fertilizer. In these ovens hot calcium carbide and pure nitrogen react upon each other until a nitrate results.

air plants. Upon the fronds, in little dots or lines, or occasionally covering the whole leaf-surface, are ripened the minute, brown, dust-like spores. These, falling upon the ground, germinate and produce a minute hair-shaped body, not resembling at all the parent fern. Upon this body are produced the organs from which, in time, springs the commonly recognized fern in its original form thus affording a perfect illustration of what botanists call alternation of generations. At one time ferns were the principal vegetable growth of the earth; in decaying they formed some of the vast coal deposits of the Carboniferous Era (which see).

FERRARA, *fer rah'rah*, ITALY, capital of the province of the same name, is a city of great historic interest. It is situated in the northern part of the country, twenty-six miles north northeast of Bologna, in a fertile but unhealthy plain. The old ducal castle, or palace, now occupied by public offices; the cathedral; the Church of San Francesco; the houses where Ariosto and Guarini lived; the cell in which Tasso was imprisoned; and a monument to Savonarola, who was born here, are some of the interesting features of Ferrara. The city has, also, a public gallery of paintings, a university, founded in 1264, a theological seminary and a library. In the fifteenth century it was famous for its school of painting, one of the best in Italy. Ferrara was at the height of wealth and power in the Middle Ages. After the close of the sixteenth century it suffered a decline. Population, 1931, 115,900.

FERRERO, *fer rá'ro*, GUGLIELMO (1872-), an Italian historian, born near Naples, the son of a railway engineer. His political writings led to lecture engagements at Milan, the College de France, Canada and the United States. His best known books are *Between Two Worlds*, *Ancient Rome and Modern America*, and *Greatness and Decline of Rome*, the last of which is considered his best work, though pronounced by critics "more ambitious than scholarly," notwithstanding the author's wide knowledge of psychology and economics revealed in it.

FERRRET, a flesh-eating animal, closely allied to the polecat, about fourteen inches in length, of a pale yellow color, with red eyes. It is a native of Africa, but has been introduced into America and Europe. It cannot, however, live long in a cold climate. Ferrets are used for hunting rabbits and for

killing rats and mice. They rarely devour the animals which they attack, but kill them



FERRET

and suck their blood. Their slender bodies enable them to enter burrows, but unless muzzled the ferrets are apt to leave their victims behind after sucking their blood.

FERRIS WHEEL, an amusement device in the form of a double wheel, between whose circles carriages for passengers were swung. It was the largest "wheel" ever constructed, and was erected at the World's Columbian Exposition in 1893 at Chicago. Its name was taken from its inventor, G. W. G. Ferris, a Pittsburgh engineer.

Each wheel was 250 feet in diameter, connected by rods and struts. At the center of the wheel was an axle 45 feet in length and 32 inches in diameter. The spokes of the wheel were iron rods 2½ inches in diameter, arranged in pairs 13 feet apart at the crown connection. The wheel carried 36 cars, attached to the circumference, each having a seating capacity of 40 passengers. The total weight of the wheel was about 1,100 tons. The wheel was elevated 14 feet above the ground, making its total height 264 feet. The total cost of the wheel was about \$300,000. At the close of the exposition it was taken down and removed to North Clark Street, Chicago, and was later taken to Saint Louis. It was finally demolished.

FERTILIZATION OF PLANTS. See CROSS FERTILIZATION; POLLEN.

FERTILIZERS, *fer'ti ly zers*, substances used to enrich soils and make them produce larger crops. All plants require a certain amount of plant food, and when for any reason a soil becomes impoverished, fertilizers are supplied to it to make up the loss. An important reason for the wearing out of soil is the repeated growing of the same plant in the same field. Different plants require different kinds of food, and by alternating the crops from season to season, soil fertility can be conserved.

The substances required by plants are oxygen, hydrogen, nitrogen, carbon, sulphur, phosphorus, potassium, calcium, iron and magnesium. Not all of these are supplied through the soil, since dioxide in the air is the source of carbon, and water is the source of hydrogen and oxygen.

Nitrogen, phosphorus, calcium and potassium are the substances which need to be supplied in greatest quantity. Nitrogen is found in abundance in manure, but a commercial fertilizer, nitrate of soda, which also contains it, is in great demand. Another commercial source is ammonium sulphate, a by-product from the manufacture of coke. Cowpeas, clover and certain other plants have the power of gathering free nitrogen from the air, and these plants are frequently used as soil renovators. Phosphate rock is the chief source of phosphorus for fertilizers, potash is the great storehouse of potassium, and calcium is supplied to the soil in the form of ground limestone, burned lime, hydrated lime, air-slaked lime or wood ashes.

Reliable information as to the best fertilizer to use in a given locality can usually be obtained by a farmer from the agricultural experiment station of his state. In most states the law requires the manufacturers of commercial fertilizers to take out a license for the sale of their products and requires a written guarantee for the amounts of essential substances which the fertilizers contain. The experiment stations analyze the fertilizers and determine the truth of the guarantees. In this way the farmer is protected against valueless fertilizers. See illustration, facing p. 1311.

Related Articles. Consult the following titles for additional information:

Agriculture	Nitrogen
Guanó	Phosphorus
Manures	Potassium
Nitrate	Rotation of Crops

FESTIVALS, or FEASTS, certain days or periods set apart for the celebration of some event. Among the Jews, six sacred feasts were prescribed by the Scriptures. The ancient Greeks celebrated the Dionysia, the Eleusinia, the four great national games, the Olympian, Isthmian, Nemean and Pythian (see article on each of the Greek games), and held many local festivals. The Roman festivals were the Saturnalia, Cerealia, Lupercalia and others. Almost all the festivals celebrated by the Roman Catholic

Church are commemorative of events in the life of Christ, such as the Sabbath, Easter, Epiphany, Nativity, Christmas, Ascension, Pentecost, Annunciation and Purification. Most of these are kept by the Church of England, with a few additions. The ancient Persians were the only people who had no festivals. Presbyterians and most other Protestant bodies, except Lutherans, recognize no church festival but Sunday, Christmas and Easter. Certain saints' days, formerly printed in red ink in the Church of England calendar, became known as *red letter days*, hence the modern use of the term. The old term, "holy day," has been changed to "holiday," which now signifies a day of merrymaking or of rest.

FETISH, or FETICH, *fe'tish*, a word derived from the Portuguese *feitico*, meaning *magic*. The Portuguese gave this name to the idols of the negroes of the Senegal, and afterward the word received a more extensive meaning. A fetish is any object which is regarded with a feeling of awe; it is believed to be possessed of mysterious powers. It may be animate, as a fowl, a serpent; or inanimate, as a river, a tooth, a shell. Fetish worship yet prevails in Guinea and other parts of the west coast of Africa. In addition to the common fetish of the tribe, every individual may have one of his own. To this he offers up prayers, and if they are not heard he punishes his fetish or throws it away or breaks it in pieces, and chooses a new one.



FEUDAL, fu'dal, SYSTEM, a system of land tenure which developed in Europe during the Middle Ages. It had its origin in the fifth century among the Franks of Gaul, whose kings, in order to keep order in the country, divided the land among their most powerful warriors. These exercised kingly power in their own domain, and pledged themselves to give military aid to the king when he needed their help. After the breaking up of Charlemagne's empire (see **CHARLEMAGNE**), feudalism developed rapidly, for it was the only system whereby the people could be protected from the lawlessness

FEUDALISM AND CHIVALRY

Feudalism

Origin
Social Organization
Act of Homage
Ceremony of Investiture
Feudal Obligations
Hereditary Rights
Feudal Manor and Families
Place of Church in Society
Military System
Decline
Defects and Merits

Chivalry

Knighthood
Knights' Virtues
Membership
Education
Ceremonies
Tournaments
Jousting
Awards
Decline
Influences

of the age. The powerful lords who were under the king divided their lands among lesser lords, and these in turn divided theirs, until there was a complete division of the people into classes, with the king at the head and the serfs at the foot. These latter were the farm laborers who were bound to the soil and considered a part of the estate.

Any piece of land granted to a *vassal*, or *retainer*, was called a *fief*, or *feud*. The one who granted it was called a *lord*, or *liege*. The lord promised his retainer protection and advice, and in return received promises of military service and other aid. On the Continent the feudal system tended to weaken the king's authority, because the feudal lords gained almost complete independence, but in England the reverse was true. William the Conqueror compelled all vassals to swear allegiance to him personally, and the nobles were correspondingly limited in power.

Feudalism died with the passing of the medieval period. Several circumstances caused its decline. Among these were the Crusades, the development of the cities, the change in modes of warfare and the opposition of the common people and kings. The Crusades weakened it because during these wars large numbers of the feudal lords were killed, and many others lost their holdings. With the development of the cities a new industrial class arose, and the workers became so strong that they were able to throw off the rule of the lord to whose fief they belonged. With the introduction of firearms the reign of the armor-clad knight passed into history, and this destroyed the military superiority of the upper classes. The common people as a whole opposed feudalism as they advanced in democracy, and the kings were also hostile to any system that undermined their authority. All of these forces, working together, gave feudalism its death blow, though it was slow in disappearing. See CHIVALRY; CASTLE; MANOR.

FEVER, a condition accompanying many diseases and characterized by a rise in temperature, a feeling of weakness, loss of appetite, headache and, frequently, pains in the body and limbs. During the fever the pulse and respiration become more rapid and the skin is dry. A period of decline usually follows the period of rise in temperature; during the lowering of temperature the patient perspires, the pain ceases and sleep usually follows.

Fever is usually caused by the development within the system of poisonous germs which have been taken in from without. What is called *intermittent fever* is one in which the temperature alternately rises and falls. In a low fever the temperature rises but little above the normal, being from 100° to 102°; but when the temperature rises above 103° and as high as 105°, the fever is considered high. Above 105° is considered very dangerous. Fever causes waste of tissue, and upon recovery the patient is left in an emaciated condition and requires some time for recuperation. See the article DISEASE, for a list of the fevers discussed in these volumes.

FEVERFEW, a plant common in waste places and near hedges. It has a tapering root, an erect, branching stem about two feet high, and stalked compound leaves, of a grayish-green color. The flowers, which resemble an ox-eye daisy, are white or cream, with yellow centers. The plant was once supposed to be a cure for fever, hence the name.

FEZ, a tall brimless hat made of fine red cloth and ornamented with a tassel. It was first made at Fez (Morocco), and that city long had the monopoly of manufacture, for the beautiful rich crimson used for dyeing it could be obtained only from a local berry. To-day the dye is chemically produced, and the fez is made in France and in Turkey. It is worn throughout Northern Africa, where it is called a *tarbush*, and in Turkey.

FEZ, MOROCCO, the chief city of the French protectorate, and one of its four capitals (the others being Meknes, Marrakesh and Rabat). It is situated about 100 miles south of the Strait of Gibraltar and nearly the same distance east of the Atlantic Ocean. The city is unattractive, for nearly all of it is filthy and unsanitary, and it has a poor water supply. The small section in which Europeans (55,000) congregate is fairly modern. There were once 800 mosques in Fez, but with the decline of the city from 400,000 people to 160,000 in 1931, nearly 700 of them have disappeared. The industries are largely devoted to the making of rugs, shawls, and the headdress called the fez (see above), and Fez is the most important commercial center of the country. The city was founded about 793.

FEZZAN, *fez zah'n*, a political division of Tripoli, belonging to Italy since 1912. The capital is Murzuk (about 5,000 people).

and this town is the center of a considerable caravan trade. See TRIPOLI.

FIAT MONEY, any kind of paper currency which is not worth intrinsically the amount stamped upon it as its value. In other words, it is given its value by the *fiat*, or order, of the government which issues it. Silver certificates, gold certificates, Federal Bank notes and the like are not fiat money; each bill of such class has behind it for redemption purposes actual value in silver, gold or other valuable material to the amount for which it passes current. The small silver coins are fiat money (see MONEY). The term was first used in connection with the greenbacks (which see) of the Civil War period.

FIBER, the threadlike portion of animal, vegetable or mineral substances. There are many varieties of fibers, and they are used for a large number of purposes, but when the term *fiber* is used without any qualification, it means *textile fiber*. The most important textile fibers are cotton, wool, silk, sisal, manila, hennequin, flax, hemp, jute and ramie, or China grass. Each of these is described under its appropriate title.

Wool and silk constitute the only valuable animal fibers, but under the term *wool* is included that obtained from the sheep, the alpaca, the Angora and other species of goat. Paper fibers include those that can be used in the manufacture of paper, but are not suitable for other purposes. The most important of this class are wood fiber and that obtained from Esparto grass and corn husks. Brush fibers include a number of fibers obtained from tropical plants, usually species of palm, and are used in the manufacture of brushes. Palmetto, tampico and cocoa fibers are the most common fibers for this purpose. Broomcorn is classed as a brush fiber by manufacturers. The finest textile fibers are usually grown in the temperate climate. With this exception, nearly all those of commercial importance are obtained from tropical or semitropical countries.

Asbestos, a valuable mineral fiber, is described under that title in these volumes.

FIBRIN, tough, jellylike substance, the solid matter which is deposited when blood coagulates. In circulating blood it is not solid, but when it is exposed to the air it causes the clot that is seen in wounds. If the wounded blood vessel is small the clot

stops the flow of blood. Fibrin can be obtained by switching newly-drawn blood with a bundle of twigs, when the fibrin clings to them in threads. The coloring matter may be washed out with water. Vegetable fibrin is substance found in grains. It somewhat resembles animal fibrin.

FICHTE, *fiK'te*, JOHANN GOTTLIEB (1762-1814), a German philosopher, born at Rammenau. He was the son of a ribbon-weaver and spent his early years in poverty, but was fortunate enough to attract the attention of a nobleman, who provided for his early education. Upon his patron's death Fichte was obliged to support himself at the university as a tutor. He studied theology and philosophy in the universities of Jena and Leipzig, and in 1791 went to Königsberg, where he met Kant and was persuaded by him to publish his *Critique of All Revelation*. This led to his appointment to a professorship in philosophy at Jena. He published several other works in the course of five years, and because the theories he expressed did not coincide with accepted religious beliefs he was forced to resign. Subsequently he was five years professor of philosophy in the University of Berlin. He died from typhus fever, contracted while taking care of soldiers who were wounded in the war of 1813.

Fichte's philosophy is founded on the idea that each of us creates his world for himself. In accordance with this idea each individual, in order to exist and have activity, must recognize something other than itself—the *notself*. Experience consists in building up varied forms of the *notself*; that is, in constructing an external world. For the sake of common convenience and because of the need of social life, it is the duty of all individuals to make their worlds as nearly alike as possible; hence, we find ourselves accepting as true the same phenomena and objects of sense. The true self, Fichte declared, cannot be the finite personality, but is the great universal self—God—whose will is everywhere expressed through the wills of finite creatures.

FICTION, *fik'shun*, a word which comes from a Latin verb meaning *to invent*. It is not difficult to see why we apply it to a class of literature which includes such writings as novels, short stories and tales of adventure. In these literary forms the author narrates events and presents characters that are

created by his imagination, that is, which he has invented. While plays like Shakespeare's *As You Like It* and poems like Longfellow's *Hiawatha* are also fiction, in the sense of being "made up," we do not classify them as fiction. That term has come to mean prose stories.

Generally speaking, books of fiction have been published in greater numbers than any other class throughout the history of book publishing in America. Since 1910, however, there has been a gradual lessening of the number of novels and other volumes of fiction published, as well as a decreasing proportion of fiction to the whole total. This is accounted for by two factors—a great war and a devastating world financial depression. Crises like these, while not ignoring lighter trends of literature, turn people's thought to serious books in which they seek information to help them over their difficulties or to keep them informed as to world trends. In such times, history, economics, civics, geography, and other vital subjects find an increased sale. In the last year of the World War, 922 books on history appeared in the United States, and only 788 on fiction. Since then, fiction has shown an upward trend.

Does Fiction Pay? The familiar picture of the struggling author starving in an attic is far from being a true picture of the successful writer of present-day fiction. Authors whose books go through several editions and are listed as "best sellers" may receive as high as a dollar a word for an original manuscript, and the sums received through royalties are occasionally fortunes in themselves. It is not unusual for a popular magazine to pay \$1,000 for a short story, and writers of wide reputation, like Conan Doyle, Rudyard Kipling, H. G. Wells, Mary Roberts Rinehart, Winston Churchill or Margaret Deland often received several times that amount. Beginners must be content with very moderate compensation until they have won a favorable place for themselves.

The Elements of a Work of Fiction. Whether a story has the scope of a long novel or is a magazine narrative of a few pages, it must have certain distinct elements. The one which comes first to mind is the make-up of the story, or, in other words, the plot. In some stories the events lead to a definite climax, and the characters are subordinated to the development of the plot; in others the plot seems to be merely a device to bring out

the development of character. A story which well illustrates a blending of the two methods, with plot and character development evenly balanced, is Hawthorne's *Scarlet Letter*.

In many of Arnold Bennett's novels, such as *The Old Wives' Tale* and *Clayhanger*, there is no outstanding plot, but there is a series of episodes covering a long period of time. Our interest, in each case, is centered in the characters, their development and growth, and we find that the events of their lives are of secondary importance. In long novels, such as these, there is usually more than one story developed. In Thackeray's *Vanity Fair* and in Dickens' *Nicholas Nickleby*, for example, there are several sets of characters introduced, and their stories are brought into the main trend of the book. The long, discursive novel is a form not adapted to the development of a single, clear-cut plot.

The human element in a story is one of its strongest points of interest, and the portrayal of character has come to have a very prominent place in fiction. There are books, such as George Eliot's *Adam Bede*, Jane Austen's *Emma*, Thackeray's *The Newcomes* or Hugo's *Les Misérables*, in which the characters seem so real that they become live personalities to the reader. On the other hand, any book whose characters are stilted and unnatural seems a disappointing thing. There is, perhaps, no more interesting line of study for the student of fiction than that which takes up the study of character.

Besides plot and characters, every story has some sort of a background. In a long novel there are often many different scenes, as in the very popular *Anthony Adverse*, by Hervey Allen. In George Eliot's *Adam Bede*, however, the background is almost wholly that of English rural life, while many modern American stories are laid entirely in the large cities. Examples of the latter are Rupert Hughes' *Thirteenth Commandment* and Frank Norris' *The Pit*. In presenting the scenes of a story the author must use a certain amount of description, and his ability to picture vividly the background of his narrative is a test of his art in this direction.

The reader sometimes finishes a book with the sense of having experienced a moral uplift, or with a new vision of some phase of life. In the time of Dickens, people who read his *Nicholas Nickleby* were aroused to the abuses of boys' schools, just as the author intended. That novel is a good example of

the purpose type. In our own times people read Upton Sinclair's *The Jungle* with much the same feeling. Yet there are many novels of high moral tone in which the lesson is not openly presented. It is there, but it is hidden in the heart of the story. A work of fiction that is truly a work of art cannot deliberately point a moral, the critics declare. Rather, it is expressed through the lives of the characters and the working out of their experiences. The reader, if he reflects at all, draws the lesson for himself.

A List of Standard Novels. The following list does not pretend to be conclusive. It gives a number of standard works of fiction, representative of the best, and all well worth reading:

The Heart of Midlothian.....	Scott
A Tale of Two Cities.....	Dickens
Great Expectations	Dickens
Henry Esmond	Thackeray
Vanity Fair	Thackeray
Les Misérables	Hugo
Eugenie Grandet	Balzac
Pride and Prejudice	Austen
Jane Eyre	Bronte
Silas Marner	Eliot
Joseph Vance	De Morgan
The Scarlet Letter	Hawthorne
The Rise of Silas Lapham	Howells
Dodsworth	Sinclair Lewis

A list of the important writers of fiction accompanies the article Novel.

FIDDLER CRAB, a small crab, so-called because one claw of the male is large and shaped somewhat like a violin. These crabs congregate in large numbers in salt marshes and make burrows in the mud just above high tide. They are vegetarians, and wander about in search of sea plants for food. When alarmed, they scurry sidewise into the first opening they can reach.

FIEF, *feef*. See FEUDAL SYSTEM.

FIELD, CYRUS WEST (1819-1892), an American merchant, the man whose faith brought the eastern and western hemispheres into instant communication by means of the ocean cable.

He was born at Stockbridge, Mass., and started in mercantile business in New York City. After a disastrous failure he acquired a large fortune, and, having



CYRUS W. FIELD
obtained a charter

giving him exclusive right for fifty years to land ocean telegraphs on the coast of Newfoundland, he organized an Atlantic telegraph company. Attempts to lay cables were made in 1857 and 1858, but without permanent success, and the Civil War having broken out, it was not until July 27, 1866, that a cable was successfully laid, the largest vessel then afloat, the *Great Eastern*, being used. Mr. Field took an active part in establishing telegraphic communication with the West Indies and South America and was connected with various important railroad enterprises. He was a brother of Stephen J. Field (which see). See CABLE, SUBMARINE.

FIELD, EUGENE (1850-1895), an American author and humorist, known especially as the poet of childhood. He was born in Saint Louis, Mo. Having lost his mother when he was but seven years of age, he was brought up by a cousin, Miss Mary Field French, of Amherst, Mass. He studied at Williams College, was transferred to Knox College, Galesburg, Ill., where he remained a year; he then completed his education at the Missouri State University, at Columbia.



EUGENE FIELD

On his return to America after a trip through Europe, Field found it necessary to turn his attention to earning a livelihood, and his taste for journalism led him into that profession. From contributor to the *Saint Louis Journal*, he rose to the position of city editor, and he was afterward connected with various papers in Saint Joseph, Kansas City, Denver and Chicago. A series of humorous articles published in a Denver paper brought him favorable notice, and in 1883 he was given charge of a department called "Sharps and Flats," in the *Chicago Morning News* (afterward the *Record* and *The Record-Herald*). In this capacity he made a wide reputation as a humorist.

He also came into notice as a lecturer. His propensity for practical joking was well known; sometimes he would amuse himself by writing verses, signing a friend's name and after publication criticising them unmercifully.

Field was a true lover of children, but his

poems, while most of them appeal forcibly to children, are also child poems for older people. *Little Boy Blue* and *Sometime there ben a lyttle boy* show his gift for mingling humor and pathos; and *Seein' Things*, *Jes' Fore Christmas* and *The Limitations of Youth* reveal his sympathy with the heart of a boy. Among his works may be mentioned *The Model Primer*, *A Little Book of Profitable Tales*, *A Little Book of Western Verse*, *Echoes of a Sabine Farm*, *With Trumpet and Drum* and *The Love Affairs of a Bibliomaniac*.

Teachers who wish to give a Eugene Field program will find helpful suggestions in the *Eugene Field Book*.

FIELD, MARSHALL (1835-1906), an American merchant, with the possible exception of John Wanamaker the greatest merchant who ever lived. He was born at Conway, Mass., and spent his boyhood on a farm, but at the age of seventeen became a clerk in a dry goods store at Pittsfield, Mass. He removed to Chicago in 1856, becoming a partner in a dry goods house, which in 1865 included the three now famous merchants. Marshall Field, Potter Palmer and L. Z. Leiter. Palmer retired in 1867 and Leiter in 1881, Field becoming head of the firm, which was thereafter known as Marshall Field & Company. In the next twenty-five years it became the largest wholesale and retail dry goods house in the world.

Field was a liberal patron of the University of Chicago and many other public enterprises. He founded the Field Museum of Natural History (which see) where many valuable exhibits of the World's Columbian Exposition of 1893 have been preserved. He was director of many corporations. The bulk of his vast fortune, estimated at from \$120,000,000 to \$150,000,000, was by his will placed in trust for his two grandchildren, aged then eight and twelve, respectively, who will not come into full possession of the property inherited by them until they are fifty years of age.

FIELD, STEPHEN JOHNSON (1816-1899), an American jurist, born in Haddam, Conn., a brother of Cyrus W. Field. He graduated at Williams College in 1837 and studied law in New York City. In 1849 he went to California with the gold seekers and exerted notable influence during the period of disorder before the admission of California as a state. After the admission of California

he served ably in the legislature. In 1857 he became judge of the supreme court of California and two years later became chief justice. President Lincoln appointed him Associate Justice of the Supreme Court in 1863 and for thirty-four years he served with marked ability. Many of his opinions are important contributions to American constitutional law. He was a member of the Electoral Commission of 1876, and voted with the minority in favor of Samuel J. Tilden (see ELECTORAL COMMISSION).

FIELD MUSEUM OF NATURAL HISTORY, named for Marshall Field (which see), who gave in all \$9,000,000 for building and endowment. The building is situated at the south end of Grant Park on the shore of Lake Michigan in Chicago, Ill. The building is of the Ionic Greek order, a magnificent structure 750 feet in length, 350 feet wide and 90 feet high, covering eleven acres. The museum is limited to four branches of science: Anthropology, Botany, Geology and Zoology. Scientific expeditions have been sent to all parts of the world for new material, and always in some region explorers are securing valuable specimens for exhibits. Through a gift from N. W. Harris, loan cases are provided for the public schools of the city. The museum was one of the features of the Century of Progress exposition.

FIELD GLASS, a magnifying instrument for viewing objects at a distance. The type of field glass commonly used consists of two short telescopes from five to ten inches long, set parallel. The magnifying power of the field glass depends upon the number of times the focal length of the objective may be divided by that of the eyepiece; hence, the length of the tube is a factor of construction. To increase the focal length of the objective, each tube is fitted with two prisms which reflect the rays.

FIELD'ING, HENRY (1707-1754), one of the greatest of English novelists, born at Sharpsham Park, in Somersetshire. He studied at Eton and at Leyden, and then went to London and began writing for the stage. He wrote several comedies and farces which failed to win popularity. In 1737 he married a Miss Craddock, a lady of some fortune. At the same time, by the death of his mother, he came into possession of a small estate. His wife's fortune he soon dissipated, and he was again obliged to depend on his pen for his living.

In 1742 appeared the first of his great novels, *Joseph Andrews*, which he had at first conceived as a burlesque of Richardson's *Pamela*. It met with instant success, and was followed by *Jonathan Wild*, a satirical work, which had little interest beyond its own day. In 1749 Fielding's masterpiece, *Tom Jones*, appeared, and this was followed two years afterward by *Amelia*. Fielding had a varied experience, and he reproduced life as he saw it. His scenes are often sordid, but are relieved by wit and humor and a sympathy for human frailties such as few authors have possessed.

FIELD MARSHAL, in Great Britain, Germany and Austria the highest title bestowed on an officer in the army. In France there is one of still greater dignity—that of marshal of France—which was borne by Ferdinand Foch, Joseph Jacques Joffre and Henri Pétain. The last great field marshal of Germany was Von Hindenburg; Britain had two in the World War—French and Haig—after the death of Lord Kitchener.

FIELD OF THE CLOTH OF GOLD, the name given to a plain in France, in the present Department of Pas-de-Calais, celebrated for the meeting (June 7 to June 20, 1520) between Henry VIII, of England, and Francis I, of France. The diplomatic results of the meeting were little or nothing, and the event is now memorable only as a grand historic parade. The splendor of the festivities and the gorgeousness of the trappings of the attendant nobles gave to the place its name.

FIREY CROSS, among the Scottish Highlanders, a cross of light wood, the extremities of which were set afire and then extinguished in the blood of a goat. This cross formerly was sent from place to place as a summons to arms and was also known as the *Crantara*.

FIFE, a small wind instrument, resembling the flute and piccolo, but having no keys. Its tube is closed at one end and is pierced with six finger holes. The player blows into a hole near the closed end of the tube, and the music produced is extremely clear and shrill. The fife is commonly used with the drum in military parades. Its ordinary compass is two octaves, from D on the fourth line of the treble staff upward.

FIFTEEN DECISIVE BATTLES. The English historian Sir Edward Creasy (which see), in *The Fifteen Decisive Battles of the World*, describes the following as the battles which have been instrumental in changing

the course of history. His book was written in 1851. Since that time other battles which historians will rank as decisive have been fought. Among these will doubtless be listed Gettysburg (1863), Mukden (1905), the Marne (1914), and again the Marne in 1918, and the Argonne battles before the armistice in 1919. The fifteen that Creasy deemed decisive are as follows:

(1) **Marathon** (490 B. C.). In this, the Greeks under Miltiades defeated Cyrus, the Persian king, and thus rendered impossible the conquest of Europe by Asiatic peoples. See Marathon.

(2) **Syracuse** (413 B. C.). In this the Athenians were overthrown and the extension of Greek rule was checked. See Syracuse.

(3) **Arbela** (331 B. C.). Alexander the Great by his victory over Darius made possible the introduction of European civilization into Asia. See Arbela.

(4) **Metaurus** (204 B. C.). This battle was the defeat of Hannibal by the Romans and brought about the destruction of Carthage.

(5) **Arminius** (A. D. 9) defeated the Roman general Varus, destroyed his legions and thus overthrew Roman dominion in Germany. See Arminius.

(6) **Chalons** (451). Here the defeat of Attila by the Visigothic king Theodoric saved Europe from devastation at the hands of the Huns. See Chalons-sur-Marne.

(7) **Tours** (732). In this battle Charles Martel defeated the Saracens and checked the spread of Mohammedanism in Europe. See Tours.

(8) **Hastings** (1066). In this battle William the Conqueror defeated Harold and won for himself the English throne and for the Normans the control of England. See Hastings, Battle of.

(9) **Orleans** (1429). In this battle Joan of Arc, by her defeat of the British and the relief of the town, made possible the liberation of France from British dominion. See Orleans.

(10) **Armada, The** (1588). The defeat of the Spanish Armada was fatal to Spanish hopes in England. See Armada.

(11) **Blenheim** (1704). Here the duke of Marlborough by his defeat of the French army checked the ambitious schemes of Louis XIV of France. See Blenheim.

(12) **Pultowa** (1709). Here Peter the Great defeated Charles XII of Sweden and firmly established the Russian empire. See Charles XII.

(13) **Saratoga** (1777). The defeat of the English under General Burgoyne by the American troops under General Gates turned the tide of the Revolution in favor of the colonists. See Saratoga, Battle of.

(14) **Valmy** (1792). The French won the victory against the armies of the allies under the duke of Brunswick, and the continuation of the French Revolution was made possible. See Valmy.

(15) **Waterloo** (1815). Napoleon I was finally overthrown by the allied armies under the Duke of Wellington. See *Waterloo, Battle of*.

FIG, the delicious and widely-used fruit of a tree belonging to the mulberry family. The fig plant was found originally in Asia Minor, but is now cultivated in various warm regions of the world. The countries bordering on the Mediterranean are important centers of the fig industry, but the fruit gives promise some day to be a profitable crop in the Southern and Western United States. California is the chief state in its production, because of most favorable climate and



BRANCH OF FIG PLANT

soil. Second is Texas, in its southern third; next, and nearly tied in production, are Mississippi and Louisiana. Alabama and Georgia follow, and elsewhere fig culture is not at all significant as yet.

The tree grows from fifteen to thirty feet in height. The so-called fruit is really the pulpy end of a stem, which has grown around and nearly enclosed the edible golden seeds. All the flowers are borne on the inner wall of this fleshy receptacle. Figs are eaten fresh, dried, canned and preserved, but they are most popular as a dried fruit, and in this form they are not surpassed in flavor or nutriment by any other dried fruit. Dried figs are more than one-half sugar, and over

eighteen per cent protein. They have a higher fuel value than sirloin steak, and are slightly laxative.

Of the several varieties, the Smyrna fig is the most desirable. It is evident that the fig fruit, being a container of the flowers, cannot be fertilized by the ordinary methods of cross fertilization, as the pollen cannot be borne about by wind or insects. Accordingly a special method of fertilization, called *caprification*, is employed. Branches of the wild fig, known as the *Capri fig*, are tied in the tops of cultivated trees. This variety is the only one that bears staminate flowers, and to effect the transference of pollen, the services of a parasitic insect called the fig wasp are used. This wasp hatches within the receptacle of the wild fig. The female wasp, in crawling about to find a place to deposit her eggs, carries pollen from the staminate flowers of the wild fig to the pistillate flowers of the cultivated variety, and as a result the large, sweet Smyrna figs are produced. Until the Capri fig and the fig wasp were introduced into California the Smyrna fig could not be grown in that state.

FIGARO, *fe ga ro'*, a type of character distinguished by shrewdness and adroitness in intrigue, first introduced on the French stage in 1785 by Beaumarchais. His is the title rôle in *The Barber of Seville*; in the *Marriage of Figaro* he is a cunning valet who hoodwinks everybody. The character was so well received that the name became synonymous with clever daring, roguery and intrigue. One of the principal journals of Paris, founded in 1826, is called *Le Figaro*.

FIGURES OF SPEECH, are phrases used with some other than their literal meaning. By figurative language we mean language in which such expressions have a prominent place. That writer was using figurative language who described Rome as a city—

"That sate on her seven hills, and from her throne
Of beauty ruled the world."

In this case Rome is thought of as a queen on her throne. It is not alone in poetry that figures are used. They are heard often in everyday speech, serving in many instances to give force and character to what is said. The boy who speaks of "cramming" for his Latin examination, and the girl who says she is studying Browning to "cultivate" her mind are using figures of speech.

It is customary to classify figurative expressions into figures of rhetoric, figures of etymology and figures of syntax. Those of the first class differ from the others in being figures of thought rather than of grammatical form. Simile and metaphor are the most common rhetorical figures. A simile is a comparison in which use is made of either one of the comparative words *like* and *as*. For example: "Charity, *like the sun*, brightens everything on which it shines." "Pleasant words are *as an honey comb*." A metaphor is an implied comparison. The two lines of poetry in the first paragraph of this article contain a metaphor, as Rome is likened unto a queen, though this is merely implied by the phrasing. Expressions such as *raging sea*, *howling wind* and *smiling skies* are metaphors, for in each case there is an implied comparison.

The figures of etymology have reference to the forms of words and consist largely in the use of such forms as *o'er* for *over* and *'twixt* for *betwixt*, while figures of syntax are variations in the construction of sentences. The most common figure of syntax is the ellipsis, by which is meant the omission of some word, phrase or clause which is essential to the grammatical completeness of a sentence, but which is omitted with the intention of making an expression more forcible. This figure is common in ordinary speech, and every such expression as *Here! for Come here! Less noise! for Let there be less noise!* is an example of ellipsis.

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Metonymy Metaphor Simile

FIJI, *féje*, ISLANDS, a group of over 200 small islands in the South Pacific Ocean, discovered by Tasman in 1643 and ceded by the Fiji chiefs to Great Britain in 1874. Only eighty of the islands are inhabited.

The total area is about 7,085 square miles. Only two of the islands are of large size, Viti Levu, or Naviti Levu, and Vanua Levu, or Vuya. The entire group is mostly of volcanic origin, and the surface is mountainous. The soil is extremely fertile and produces cocoanut palms, breadfruit, bananas, pandanus, oranges, taros, yams, sweet potatoes, maize, tobacco and sugar cane. Timber trees, including the chestnut, are plentiful; sandal wood is now scarce. The chief occupation is agriculture.

The islands constitute a British Crown colony, under a governor, assisted by an

executive council and legislative assembly. Native chiefs take part in the administration. Since the annexation the prosperity of the colony has been remarkable. The chief article of export is sugar; the next is copra, the dried kernels of the cocoanut. The other important exports are cotton, molasses and coffee. The capital is Suva, on the south coast of Viti Levu; the European population of the town is about 1,800.

The island of Rotumah, to the north, was annexed to Fiji in 1881. The inhabitants are of middle stature, strongly built, with a complexion between copper color and black, and for many years have been Christians. Population, 1933, 193,250.

FILE, a hand tool, the essential part of which is a rod or bar of steel with rough surface, used for cutting down and shaping metal and other hard surfaces. There are three distinct "cuts" of file, from which an almost endless variety of forms have been developed. These are the *single-cut*, *double-cut* and *rasp*. All have varying degrees of coarseness, designated by the terms smooth, second-cut, bastard and coarse. The single-cut file surface is traversed by diagonal parallel furrows; the double-cut surface by diagonal furrows crossing at right angles. The rasp is a toothed file. Instead of furrows angular pits made with a pointed punch, cover its surface. The several kinds of files are grouped according to the shapes of their cross-sections into square, triangular, round, and so on. The pointed end of the file which fits into the handle is called the tang. Most files are pointed at the end opposite the handle, though not always; blunt files, which do not taper, are used in the trades.

FILE FISH, a name given to certain fishes, from the fact that the dorsal spine is roughened like a file. One species, a common inhabitant of the Mediterranean, which grows to the length of two feet, has the power of inflating its sides at pleasure. The best-known filefish is the barnacle eater, found north of England. It is of a tawny color and is often seen in aquariums. These fishes are related to the trigger fishes.

FILIBUSTERS, private citizens of one country who interfere in the affairs of another with which their country is at peace. The name has been chiefly used to refer to those citizens of the United States who endeavored to establish settlements in the Spanish islands and colonies in Central

America, and later to control the policies of those colonies, and also to those who had illicit relations with the insurgents during the rebellions of the Spanish colonies. Among the most noted of the filibusters was William Walker, who made three expeditions to Nicaragua (1855, 1857 and 1860). See WALKER, WILLIAM.



FILLMORE, MILLARD (1800–1874), thirteenth President of the United States, and Vice-President in Taylor's administration until the latter's death. Fillmore was the second President to attain the office of chief executive through the death of the head of the government, the first having been John Tyler. His name is not connected with such stirring events

in American history as the name of Lincoln, McKinley or Wilson, and his personality made no such impression as that of Jackson, Cleveland, or Roosevelt, but an impartial study of his administration compels respect for the sincerity and honesty of the man.

Fillmore was born on February 7, 1800, at Summer Hill, New York. His father was too poor to give him even an ordinary school education, and at the age of fifteen Millard became an apprentice in the wool-carding trade. During his apprenticeship he spent every spare moment in reading and study. A lawyer named Wood became interested in him, and when the youth was nineteen took him into his office to study law, placing at his disposal funds for the prosecution of his studies. Fillmore devoted part of his time teaching school. In 1821 he removed to Buffalo, where, in spite of his inadequate training, he was admitted to the bar in 1823. In 1828 he was chosen as an Anti-Mason representative in the state legislature, and there he procured the passage of a bill abolishing imprisonment for debt in New York.

A firm believer in Whig principles, he became a Whig member of Congress in 1832, and was reelected several times. In Congress he was one of the opponents of Jackson and Van Buren and a supporter of Clay, but he always exercised his right of independent

judgment, and when Clay favored the re-establishment of the National Bank, Fillmore took the opposite side. He believed in protection, and in 1842, when he was chairman of the Ways and Means Committee, he helped to frame the tariff law of that year. Fillmore retired from Congress in 1843, was defeated for the governorship of New York in 1844, and was elected comptroller of the state in 1847. In 1848, at the Whig national convention, he was nominated for the Vice-Presidency on the ticket with Zachary Taylor, and was elected.

Fillmore became Vice-President of the United States and president of the Senate at a time when Congress was in the throes of the slavery controversy. Personally he objected to the extension of slavery, but he fully agreed with Clay in the matter of compromising with the South, for he believed that to make concessions was the only way to save the Union from disruption. It is significant that he was so fair and unbiased while presiding over the Senate debate on Clay's Compromise Bill of 1850 that no one knew on which side he stood. In the midst of the turbulent slavery debate he was called to the Presidency by the death of President Taylor (1850).

Fillmore began his administration by selecting a strong Cabinet, headed by Daniel Webster. As Senator, Webster had exerted his influence for the passage of the Compromise, or Omnibus Bill, as it was called, making his last great speech in its favor, and Fillmore signed all of its provisions as soon as it passed Congress. His Northern Whig friends, however, disapproved of his signing the Fugitive Slave Law, and through this act he lost their support. The other important events of his administration were a treaty with Japan opening up that country to trade, reduction of the postage rates, beginning of the building of Pacific railways and the publication of *Uncle Tom's Cabin*.

Though Fillmore desired a renomination, the Whigs chose Scott as their standard bearer in the campaign of 1852, and their ticket was defeated. In 1856 Fillmore was nominated by the Whigs and Know-Nothings, but Buchanan won the election. He then retired to private life in Buffalo.

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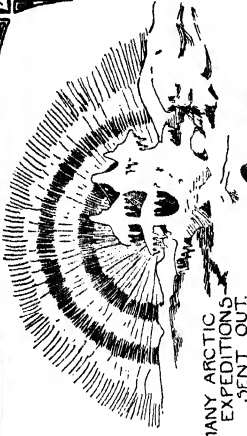
Clay, Henry	Political Parties
Compromise of 1850	in the United States
Kossuth, Louis	Tariff

ADMINISTRATIONS OF TAYLOR AND FILLMORE

1853

1849

NEW SLAVE STATES OUTSIDE
THE UNION TO BE DIVIDED INTO
FIFTY-TWO TERRITORIES, SLAVERY
LAW TO BE PROHIBITED IN ALL
THE TERRITORIES EXCEPT IN
THOSE WHERE IT IS ALREADY
ESTABLISHED.
THE TERRITORIES OF
ARIZONA, CALIFORNIA, COLORADO,
IDAHO, KANSAS, MICHIGAN,
MINNESOTA, NEBRASKA, NEVADA,
NEW MEXICO, OREGON, TEXAS,
UTAH, VIRGINIA, AND WYOMING
TO BE ADDED TO THE UNION
WITHOUT SLAVERY.

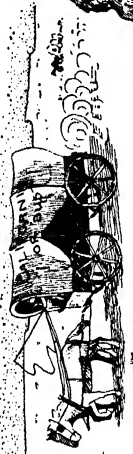


MANY ARCTIC
EXPEDITIONS
SENT OUT.



MAINE PASSED
FIRST TEMPERANCE
LAW. 1851.

SMALL
TOWNS
CABIN
BUILT



THE
OMNIBUS BILL
1850.

THE OVERLAND ROUTE TO CALIFORNIA.

CALIFORNIA ADMITTED
TO THE UNION
1850.



OTHER EVENTS OF IMPORTANCE	
PACIFIC RAILWAY SURVEYS ORDERED.	1853.
HUNGARIAN PATRIOT KOSSUTH SEEKS AID IN UNITED STATES.	1852.
CLAYTON-BULWER TREATY.	1850.
REDUCTION OF POSTAGE RATES.	1853.
DEATH OF CALHOUN.	1850.
DEATH OF DANIEL WEBSTER.	1852.



"THE UNDERGROUND RAILWAY."

DEATH OF
PRESIDENT TAYLOR
JULY 9, 1850

**Administration of Millard Fillmore
1850-1853**

I. THE PRESIDENT

- (1) Birth
- (2) Ancestry
- (3) Training
- (4) Public career
- (5) Character
- (6) Death

II. GOVERNMENTAL AFFAIRS

- (1) Foreign
 - (a) Treaty with Japan
 - (1) Beginning of trade relations with the United States
 - (b) Relations with Austria
 - (1) United States agent watching Hungarian Revolution
 - (2) Austria's protest
 - (3) Webster's famous reply
 - (4) Aid for Kossuth
- (2) Domestic
 - Reduction of rates of postage

III. INTERNAL AFFAIRS

- (1) Operation of the Fugitive Slave Law
- (2) Uncle Tom's Cabin
- (3) Maine prohibits sale of liquors
- (4) Visit of Kossuth
- (5) Deaths of Clay and Webster
- (6) Beginning of Pacific railways

IV. ELECTION OF 1852

- (1) Importance of conventions
 - (a) For candidates
 - (b) For platforms
- (2) Issues
- (3) Candidates
 - (a) Scott
 - (b) Franklin Pierce
- (4) End of the power of the Whig party

invented by Pasteur, a celebrated French bacteriologist. This filter consists of a vessel of very thin porous earthenware enclosed in a metallic tank. When it is fastened to a water faucet the water pressure forces the water through the filter into the tank, from which it is drawn off as required by means of a spigot.

A filter can easily be constructed with materials within the reach of almost every one. An ordinary flower pot of large size can be converted into a useful filter in the following manner: Fill the hole with sponge. Into the bottom of the pot put a deep layer of powdered charcoal; above this put a layer of clean sand, and on top of this a layer of gravel. Pour the water to be filtered into the pot and underneath the filter put a vessel into which the filtered water may drip. The filtering material should be changed frequently.

FINCH, a general name for the large group of birds known as seed-eaters. They inhabit all parts of the globe, and are distinguished by their sharply pointed, conical and usually strong bills, suitable for crushing seeds and other hard objects. There are about 550 species, which have been classified into several subfamilies and many general. Though most of them are sober in their coloring, some are particularly brilliant, and many of them are fine singers. To this group belong the canary, chaffinch, goldfinch, bunting, crossbill, grosbeak, linnet, sparrow and many other species. See the article **BIRD**, for lists of birds described in these volumes.

FINDLAY, OHIO, founded in 1829, is the county seat of Hancock County, forty-four miles south of Toledo, on the Blanchard River and on the New York Central, the Nickel Plate, and the Baltimore & Ohio railroads. There is an airport, and several interstate bus lines. The city is in a region having oil wells, besides deposits of building stone, lime, sand and gravel. The varied industries include a sugar factory, porcelain and clay pottery companies, brick, tile, and crushed stone works, automatic stokers, earth digging machinery, medicinal remedies, and manufactures of tires and gloves. There are other factories of lesser note. Findlay was incorporated in 1837. It has a public library and a hospital and is the seat of Findlay College, which is under the auspices of the Church of God. Population, 1930, 19,363.

FILTER, a contrivance or substance for taking from water impurities or solid particles held in suspension. Spring water is filtered naturally by being passed through beds of sand and gravel in the earth; but rain water, lake water and river water should be artificially filtered before it is used. One of the best of the manufactured filters is that

FINE, a cash penalty, exacted either in punishment of, or in compensation for, an offense, whether committed against an individual, in contravention of the laws of the community, or against the community itself. Sometimes a prison or jail sentence accompanies a fine.

FINE ARTS, the arts which appeal to man's sense of beauty and whose object is to give pleasure. In the history of mankind the fine arts developed early. In fact, the artistic impulse may be said to have first manifested itself when the cave dweller with colored chalk drew crude pictures on his walls to relieve their gloom and divert himself through the long evenings. Then, as now, art was the expression of the man himself, the activity of his leisure moments, when the pressure of outward necessity was temporarily removed. In nearly every civilized person there is a craving for beauty, though the craving is often perverted. In its highest manifestation it finds expression in architecture, painting, sculpture, music and poetry. Art is not as it has been called, an imitation of nature, but rather the artists' impressions of nature.

FIN'GAL'S CAVE, a famous natural cavern in the island of Staffa, one of the western islands of Scotland. It extends 227 feet from its mouth inward, and is flanked by lofty basaltic columns, beautifully jointed. The height from the top of the arched roof to the mean level of the sea is sixty-six feet, the breadth at the entrance is forty-two feet, and the width at the end of the cave is twenty-two feet. This cavern is believed to have been hollowed out of lava deposits by the action of the waves.

FINGER PRINT IDENTIFICATION, a method of detecting criminals by taking impressions of the markings on the ends of the fingers. Since no two persons, so far as known, have exactly the same markings, and the prints on the fingers of an individual do not vary during lifetime, an impression of a person's finger prints is a sure and permanent record of an individual characteristic. This method of identifying criminals is now used by the detective service of every country. It is customary to have the person whose record is taken, place his fingers on a sheet of glass covered with India ink, and then press them upon white paper. An interesting tale based upon finger print identification is Mark Twain's *Pudd'nhead Wilson*.

FIN'LAND, from 1721 to 1917 a grand duchy of the Russian Empire. In 1917, after the Russians had overturned the czarist régime, Finland declared its independence. It is a small country in Northwestern Europe between Russia proper and the Scandinavian peninsula. Its southern part forms the peninsula between the Gulf of Finland on the south and the Gulf of Bothnia on the west, and it extends northward in a narrower arm nearly to the Arctic Ocean, with Sweden on the west and Norwegian Lapland on the north. Its length is 700 miles; its greatest width, 400 miles. The total area is 134,559 square miles, or slightly greater than that of New Mexico. About ten per cent of the surface is in lakes. The population in 1931 was about 3,667,000; nearly all of the people are Finns and adherents of the Lutheran Church (see **FINNS**). There are also many Swedes in the country, as well as a few Lapps and Russians.

Finland is a low, flat country, except in the north, where rolling hills rise to nearly 4,000 feet. The coast line is deeply indented, and thousands of little rocky islands are near the shores; these belong to Finland. So much of the area is covered with forests, lakes and swamps that less than five per cent is agricultural land, but on the tillable soil the people manage to subsist. It is therefore not strange that the inhabitants are not well-to-do. The products of the soil are wheat, rye, oats and potatoes. Dairying is important in the southern area. There has been but slight attempt to work the deposits of iron, copper and granite the country is known to contain. While there are great possibilities for utilization of water power, manufacturing is not developed.

History. The Finns, who are of Mongolian blood, were an independent tribe in the twelfth century, but gradually Sweden began to dominate them, and a century later it came into control of their country. Russia endeavored to take Finland many times, but not until 1721 did it gain any foothold; then it annexed a considerable territory. Not until 1809 did it wrest from the Swedes the entire province. Russian rule was characteristic. The czar named himself as grand duke of the duchy; his governors for years kept the pledge given to the Finns that their old laws and liberties should be preserved, but in 1897 a severer régime began, by which the duchy was made to feel the iron hand of

autocracy. Uprisings secured a return of the privileges of home rule, but in 1910 a law was passed giving the Russian Duma control of all matters affecting Russia and Finland together. The grand duchy had its Diet, or Parliament, which passed laws of local interest. The chief executive officer was a governor-general, appointed by the czar. Woman suffrage prevailed.

In 1916 the Finns elected a new Diet of 200 members, but it was not permitted to convene. After the downfall of the czar and the rise to power of Kerensky, the Finnish Parliament was directed to open. In October, just before Kerensky was driven from power, a new election was called, in which ninety-two seats out of 200 were won by Socialists. In November the Diet voted to inaugurate a régime of complete independence, and to abolish the post of governor-general. Before a stable government could be established Finland was torn by civil war between the "White Guards," or conservatives, and the "Red Guards," or radicals, who favored a Bolshevik régime. On January 27, 1918, the latter took over the government buildings, in Helsingfors, and declared a republic of Finnish workers. Two months later a German army landed, formed a junction with the "Whites," and cleared the country of the Bolsheviks. Efforts were made to set up a monarchy with a German prince as ruler, but this plan collapsed with the defeat and surrender of Germany in the fall of 1918. The movement for independence resulted in the establishment of a Republic, under the constitutional law of June, 1919. The constitution gives full legal and suffrage rights to women. Finland was the one country of Europe that honored its war debt to the United States by making regular semi-annual payments. See RUSSIA; WORLD WAR.

FINLAND, GULF OF, a great arm of the Baltic Sea, 250 miles long and from ten to seventy miles wide, stretching from west to east between Finland on the north and Esthonia and Petrograd on the south. Its waters are only slightly salt. It contains numerous islands and has several excellent harbors and strong fortresses, which were the object of frequent attack in the World War (which see). Navigation is impeded by rocks and sand banks and by ice in winter. The ports on this gulf are Kronstadt, Viborg and Helsingfors.

FINLEY, JOHN HUSTON (1863-), a prominent American educator, was born at Grand Ridge, Illinois. He studied at Knox College and at Johns Hopkins University. He became president of Knox College in 1892 and remained in that office until 1899, when he accepted the chair of political economy at Princeton University. In 1903 he was chosen president of the College of the City of New York, and in 1913 New York State Commissioner of Education. Since 1921 he has been Associate Editor of *The New York Times*. He has served as Harvard University exchange lecturer at the Sorbonne and as president of the American Social Science Association. In collaboration with R. T. Ely he wrote *Taxation in American States and Cities*; and with J. T. Sanderson, *The American Executive and Executive Methods*.

FINNAN HADDIE. See HADDOCK.

FINNS, a race related to the Mongolians, forming the greater part of the population of Finland (which see). The typical members of this race are of low stature but of strong build, with round head, low, arched forehead, flat features, with prominent cheekbones and oblique eyes. Their language belongs to the northern division of the Turanian family of languages and is most nearly allied to the languages of the Lapps and Hungarians. It is agreeable to the ear, rich in vowels and diphthongs, copious and uncommonly flexible. Finnish literature is valuable chiefly for its rich stores of national poetry, and among its treasures is the famous folk epic *Kalevala* (which see).

A great impulse has been given to the cultivation of the language in modern times. It is now recognized as an official language, side by side with Swedish, and is becoming more and more the vehicle for imparting instruction. In many of the higher educational institutions for both sexes in Finland, the Finnish language is used. Works on science and history, as well as poetry, have been written in Finnish in recent years; a great Finnish-Swedish dictionary has been published, and there are now a considerable number of newspapers. The center of this literary life is Helsingfors.

FINS, the projecting, winglike organs which enable fishes to balance themselves and which assist in regulating their movements in the water. The fin is a thin, elastic membrane, supported by bony or cartilaginous

rays. The breast fins are never more than two and are immediately behind the gill. In a state of rest these fins are drawn in parallel with the body and have the apex toward the tail. The terminal fins are located under the throat and belly and point downward and backward. They are smaller in general than the breast fins and sometimes have long appendages. The fins of the back point upward and backward and vary in number from one to four, to which are sometimes added several little fins, as in the case of the mackerel. Other fins are placed vertically near the tail. The tail fin, which terminates the body and serves as a rudder, assists in propelling the fish. The shape, location and character of the fin vary with different genera.

FIN'SEN, NIELS RYBERG (1861-1904), a Danish scientist, the discoverer of the method of curing lupus, or tuberculosis of the skin, and other skin diseases, with light rays. In 1890 he was graduated from Copenhagen University and began at once the research which led to his wonderful discoveries. So great were the benefits resulting from his researches that the Danish government helped him to establish Medical Light Institute in a suburb of Copenhagen. There he labored until his death to perfect his methods of applying light to the treatment of disease. In 1903 Professor Finsen received the Nobel Prize for his contributions to medical science.

FIORD, or **FJORD**, *fyord*, a geographical term (of Scandinavian origin) applied to long, narrow and very irregularly-shaped inlets of the sea, such as occur on the coast of Norway, along the shores of Maine and in British Columbia and Alaska. Similar inlets of the sea are presented in the sea lochs and firths of the coast of the British Isles, and also in the fiords on the southwest coast of the South Island of New Zealand, where the scenery is singularly imposing. Fiords owe their origin to the action of glaciers in remote epochs of the earth's history.

FIR, *fur*, the popular name applied to many cone-bearing trees, particularly those evergreens with short, needlelike leaves distributed all over the stems, as distinguished from *pines*, whose foliage grows in bunches. The leaves of the fir are sharp and flat, dark green on the upper surface and light green on the under side. They grow in rows on opposite sides of the stem. The typical fir is cone-shaped, and its branches near the

ground. There are a number of species.

In the United States the *balsam fir* is the common eastern species, abundant between Hudson Bay and Virginia and as far west as Minnesota. They rarely grow to a greater height than thirty feet. Canada balsam is prepared from the sap of this tree. The fir of the Pacific states is known as the *silver*, or *lowland*, *fir*. It is a gigantic tree, often reaching a height of 300 feet. The white soft wood of this tree is used for boxes, barrels and carpentry work. The *red fir* of the same region is of much the same character. The balsam fir is probably the most familiar species, for it is chosen for Christmas trees almost exclusively.

FIRE. When primitive man, in the lowest stages of savagery, saw forest fires which the lightning had started, he believed them to be great fire-monsters which must be placated. Later the savage discovered that fire was a most useful thing, furnishing light and heat, and he learned how to produce it and to conquer it. With its conquest mankind advanced from lower to middle savagery, and it came to be an indispensable thing through all stages of development. To-day fire is the basis of the world's industrial life, and a vital source of man's comfort, for it cooks his food and warms him in winter.

Fire is the result of the chemical union of various substances with oxygen. If we wish to make a blaze burn more brightly we fan it, because by furnishing more air and thus increasing the supply of oxygen we are providing the fire with the thing essential to it. Everyone knows that a fire is quickly smothered if a woolen cloth is thrown over it. This is due to the fact that air is excluded from the blaze. Notwithstanding the value and uses of fire in modern civilization, it is also a destructive force, and uncontrolled fires have burned up property worth countless millions of dollars. One of the important educational movements of to-day is that directed toward the prevention of unnecessary fires. Homes and industrial plants are being built with greater care, and stricter regulations are in force as to inspection and supervision of buildings. See **FIRE DEPARTMENT**.

FIRE ALARM, an apparatus for announcing the breaking out of a fire. Simple fire alarms are often placed in large buildings. These are usually automatic and are so constructed that a rise in temperature be-

yond a given point closes the circuit which operates an electric signaling apparatus; but the fire alarm in most common use is that connected with the fire departments of cities. This consists of a central office, or signal station, containing the batteries and signal bells, which are connected with alarm boxes stationed at different places in the city. The alarm boxes are of iron and are closed with two doors. When necessary to "turn in" an alarm, the box is opened, and the handle, which is either a crank or a hook, is pulled down. This turns a wheel which closes the circuit and rings the gong in the central office and another in the engine house in the district in which the alarm box is located. The gong gives a number of strokes corresponding to the number of the box from which the alarm is sent in, and at the same time a recording apparatus in the central office indicates the number of strokes. If additional alarms are required, they are sent from the central office.

FIREARMS. See ARMS AND ARMOR; CANNON; GUN; MACHINE GUN; MUSKET; PISTOL; REVOLVER; RIFLE; SHOTGUN; and other kindred titles.

FIREBIRD. See BALTIMORE ORIOLE.

FIRE CLAY, a compact kind of clay, consisting chiefly of silica and alumina, capable of sustaining intense heat and used in making fire bricks, gas retorts and crucibles, and for lining blast furnaces. Fire clay belongs to the coal formation and always forms a stratum immediately below each seam of coal. See CLAY.

FIRECRACKERS, toy bombs, consisting of cylinders of paper, enclosing an explosive powder, which is ignited by a fuse projecting from one end. The Chinese or Hindus were the first makers of fireworks, and probably gunpowder or something like it was burned on festival days several thousand years ago in China. Firecrackers were sold in great quantities in America for many years, and were used chiefly in celebrating the Fourth of July. With the progress of the movement for a quieter Fourth their sale has declined.

They range in size from about $\frac{1}{2}$ an inch to more than 1 foot in length, and from $\frac{1}{8}$ of an inch to 3 inches in thickness. The tube of the cracker is made of strawboard, the fuse is spun cotton, soaked in a mixture of starch and gunpowder, and the explosive is a mixture of powdered charcoal, bichromate of potash and chlorate of potash. In the

Dominion of Canada in many places firecrackers are used on Victoria Day (May 24) and also on Dominion Day (July 1). See FIREWORKS.

FIRE DAMP, the name given by miners to light, carbureted hydrogen gas, marsh gas or methane, generated by the decomposition of partially-carbonized coal. It is sometimes very abundant in coal mines, and is frequently productive of the most dreadful results, for if mixed with air it is highly explosive and takes fire readily from an exposed flame. In many cases it has occasioned explosions and caused hundreds of deaths. The miner's safety lamp affords the chief protection against this gas.

FIRE DEPARTMENT, the organization and appliances for extinguishing fires. The fire department of a large city is a highly organized body, under the control of a chief and several assistants. It is usually divided into companies, each under the immediate control of a captain. One or more of these companies occupy a fire station, where also the fire engine, hose cart and other material are kept. When an alarm of fire sounds, trained firemen take their stations on the engine trucks, ladder and hose trucks, the warning bells clear the streets to insure speed to the scene of disaster, and within a short time, the ladders (if needed) are placed in position to rescue people caught in the burning building, coverings are provided for merchandise to prevent waste, and the engines are sending streams of water (or sometimes of chemicals) to reduce the flames. In some cities a central power station with powerful pumps maintain a constant pressure in the water mains, so that when hose is attached to the hydrants, a strong force projects the stream, without the use of a local engine.

Motor-driven trucks and engines have largely displaced those which are horse-driven, except in very small communities.

Various devices are used for rescuing people from burning buildings. These comprise scaling ladders, large canvas "blankets", into which persons may jump from a burning building, tubes of strong canvas, through which persons may slide to safety. Fire boats with powerful pumping apparatus are provided in large cities where water communication permits their use. See FIRE ENGINE.

FIRE ENGINE, an engine for throwing water to extinguish fires. A fire engine is simply a strong force pump, with the neces-

sary machinery for working it and supplying it with water, which is forced through the hose at high pressure. The older types of fire engines were worked by hand, and the majority of the fire company gave their attention to working the pumps. Now nearly all fire engines are operated by steam. The engine consists of two pumps attached to a steam engine and the whole mounted upon a wagon. The water is carried to the fire through strong rubber tubes about four inches in diameter, called *hose*. Several hundred feet of hose accompany every engine. The largest fire engines will pump 1,300 gallons a minute and throw a stream of water as high as a five-story building, while the smallest size will throw about 300 gallons a minute. The first steam fire engine operated in the United States was in Cincinnati, in 1850.

FIRE ESCAPE, a contrivance for enabling people to escape from the upper part of a building when it is on fire. Many patterns of fire escapes have been placed in use. The most common pattern consists of an iron ladder, attached to the building, with a platform or balcony at every story. A new pattern for schools is a cylindrical form, built on the plan of a "chute-the-chutes" into which children can climb and slide to safety. Fire departments use systems of extension ladders, as well as tubes made of sailcloth, through which persons can make an easy descent. All states have stringent laws requiring all buildings to be equipped with fire escapes, if four or more stories in height.

FIRE EXTINGUISHER, an apparatus for extinguishing fire by means of water charged with gases that kill flame. The fire extinguisher consists of a cylinder which will hold four or five gallons. When the cylinder is charged it is filled with water, into which is put about a pound of common cooking soda. A bottle holding about half a cup of sulphuric acid is fastened in a frame which is attached to the cup. When the cup is screwed in place the extinguisher is ready for use. When the extinguisher is wanted the bottle is emptied by pulling a rod which passes out through the cup. The acid acts upon the soda in the water and sets free a large quantity of carbonic acid gas, which creates a pressure and forces the water out through small holes at the bottom of the cylinder. Fire extinguishers are useful in extinguishing small fires. A larger pattern, sometimes called the *chemical engine*, usually

is a part of the equipment of the fire department of large cities.

FIREFLY, a beetle which has the power to give off light in the darkness. There are several species of beetles to which this name is applied. No one knows exactly how the spark is produced, but the light-giving apparatus consists of a system of air tubes and nerves, embedded in fatty tissue. The nerves stimulate the air tubes, and oxygen is conveyed by them to the tissue. In Europe and South America there are fireflies having no wings, but those in America are winged. It is said that the natives in the tropics put fireflies in bottles and use them as lanterns. Lightning bugs and glowworm are other names frequently applied to light-giving insects.

FIRE INSURANCE. See **INSURANCE**.

FIRELESS COOKER, a device for cooking food with the minimum expenditure of heat. It consists of a box which can be tightly closed, and which is stuffed with hay or some other substance which will not conduct heat, space being left for one or more covered kettles. The food is boiled for a few minutes, until it is heated through, and is then covered and placed in the cooker, which keeps in the heat and allows the food to cook slowly. Meats which are not the more tender cuts; vegetables which require long cooking, as cabbage or dried beans; hard cereals, as rice or cracked wheat, are improved by cooking in a fireless cooker, and are far more economically prepared.

How to Make a Cooker. A homemade cooker can be devised with little expense. Select a wooden box and give it a hinged cover. For the inside container, in which the pot or other cooking dish is to be placed, use a strong pasteboard cylinder. Pack hay, excelsior, newspapers or other material around the cylinder, bringing the packing up to a level with the top of the container. The latter should be four inches below the lid of the box. The space in between should be occupied by a cushion stuffed with cotton or excelsior. Kettles with two compartments, for fireless cookers, may be purchased.

FIRENZE. See **FLORENCE**.

FIRE-PROOFING, a process by which substances are made proof against destruction by fire. A surface of asbestos (which see) is the best fire-proof material, though silicate and tungstate of soda, borax and phosphate of ammonia will temporarily re-

sist considerable heat. If wood is thoroughly soaked in silicate of soda it will not scorch for some time under even intense heat.

After the Iroquois Theater fire in Chicago in 1903, in which 575 people lost their lives, laws were speedily passed everywhere requiring asbestos curtains for theaters. No successful fire-proofing material has been found for clothing, but fabrics may be made partially fire-proof by being soaked in a solution of tungstate of soda or sulphate of ammonia.

FIREWORKS, preparations of gunpowder, charcoal, sulphur, saltpeter and other substances, used for display at celebrations of a public character. They may be divided into simple hand pieces, such as squibs, crackers, rockets and Roman candles, and arranged "pieces," which are contrived with much skill and ingenuity to represent, when ignited, various devices and pictures.

FIRE WORSHIP, one of the earliest forms of worship among mankind. Nearly all primitive peoples have at some stage of their development worshiped fire. Sometimes this worship has taken the form of devotion paid to the physical element fire; often the veneration has been paid to a god of fire or to some spirit supposed to preside over fire or to reside in it. Certain native tribes of West Africa and also the savage tribes of the American Indians paid homage to a fire spirit. Among other recent examples of fire worship was the Polynesian and Mexican worship of a god of fire. Sacred rites glorifying fire were performed by the ancient Egyptians, Assyrians, Chaldeans and some half-civilized Mongolian tribes. Many of the primitive peoples of Asia and also of Europe, including the early Greeks and Romans, had fire rituals. Among some early peoples, such as the followers of Zoroaster, fire was merely a symbol of divinity.

FIRST AID TO THE INJURED. The first and absolutely essential thing to do in case of serious accident or injury is to summon a reliable physician, but often before his arrival steps may be taken which will be of very great benefit to the patient. These will be found described in special articles upon the emergencies which are of most frequent occurrence. Thus, the antidotes for common poisons are described in the article **ANTIDOTE**. See, also, **BURNS AND SCALDS**; **ARTERY**; **VEINS**; **DROWNING**; **SUNSTROKE**; **WOUNDS**; **FAINING**.

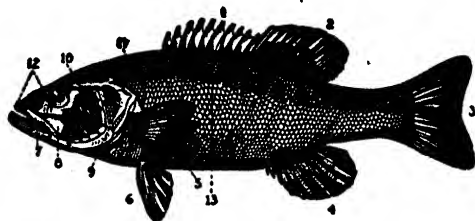
FISH AND FISHERIES. Among the vertebrates (back-boned animals), the fish are lowest in order of intelligence, but among the most important from an economic standpoint. From earliest historic times men have used the flesh of fish as food, and to-day there is hardly a country in the world whose people do not include it in their diet.

Characteristics of Fish. Fish constitute the class *Pisces*, which is divided into about 13,000 species. All are back-boned animals, living in water. Notwithstanding the numerous species, fishes show a remarkable uniformity in appearance, for the greater number have elongated, compressed bodies, tapering toward both ends, with paired fins to take the place of limbs. This form of body is well adapted to meet the pressure of water. The body is generally covered with scales or bony plates, though a few species lack such covering.

With the exception of a small family of fresh-water fish, which possess both lungs and gills, fish breathe wholly by means of gills, which are designed to extract oxygen from the water (see **GILLS**). They have cold, red blood, which is pumped through the system after being purified by passage through the gills. The backbone is composed of vertebrae, and is so loosely jointed that the body can be turned and bent freely in all directions. Fish possess in their air bladder, or *sound*, an organ peculiar to themselves, which they are able to fill or empty at will. Authorities are not certain as to the purpose of this organ, but some scientists believe that it is used as a balance. The skeletons of some families of fishes are not of bone, but of a strong, thick cartilage.

Geological investigations show that there have been many thousands of species of fish now wholly extinct, but the 13,000 that survive are distributed throughout almost all the waters of the earth. Those in temperate or tropical waters are more brilliantly colored and strikingly marked than the inhabitants of colder waters. In most species the colors increase in intensity and beauty during the breeding season, much as the plumage of a bird grows bright. Some fish feed on both animal and vegetable matter, others are flesh-eaters, and some eat only vegetable food. They reproduce by eggs, these being laid in shallow water. The eggs are usually left uncared for, though some species, like the stickleback, gather the eggs in nests and pro-

teet and care for their young. Millions of eggs are laid by a single fish, but the young are preyed upon by so many enemies that



SMALL-MOUTHED BLACK BASS

- | | |
|---------------------------------|---------------------------|
| 1. Spiny portion of dorsal fin. | 7. Mandible or lower jaw. |
| 2. Soft portion of dorsal fin. | 8. Maxillary. |
| 3. Caudal fin. | 9. Opercle. |
| 4. Anal fin. | 10. Cheek and Preopercle. |
| 5. Pectoral fin. | 11. Lateral fin. |
| 6. Ventral fin. | 12. Snout. |
| | 13. Depth. |

relatively few survive. In size fish vary from tiny minnows, an inch or so in adult length, to man-eating sharks thirty-five feet long. Whales (which see) are mammals, though they bear certain resemblances to fish.

Deep-Sea Fishes. Before 1872, when the British government sent out the *Challenger* expedition, deep-sea fishes were not known to any great extent, although the explorations of a few scientific expeditions of earlier date had taught scientists that there were remarkable and astonishing forms of animal life in the ocean depths. The absence of sunlight, the low, even temperature, the enormous pressure and the absence of plants all tend to establish in the denizens of these seas many peculiarities. Fluids within their tissues enable them to resist the great pressure upon them, and their bones contain a large amount of cartilage.

Most of the deep-sea fishes are dark-colored, and there is less variation of color than in those which live near the surface. Some of them are blind, as no light penetrates to the depths in which they live, and those that do have eyes are believed to see by means of phosphorescent light, which is shed by the bodies of large numbers of deep-sea creatures. Sensitive organs of touch, large jaws and formidable teeth are common characteristics.

Fisheries. The capture of fish for economic and commercial purposes is an important industry all over the world. It is estimated that fresh-water and ocean fish having a value of \$900,000,000 are caught every year. With the expansion of the fishing in-

dustry have come new developments in regard to conserving the supply, breeding, preserving natural spawning grounds, marketing and distribution of the product, etc. (See *Fish Culture*, below.) In regard to methods of capture, it may be said that the hook and line and nets are the devices most commonly used. In extensive sea fishing the familiar hand line is replaced by the long "set" line, having attached to it at intervals shorter lines with hooks. Sometimes a fishing schooner will operate lines aggregating several miles in length and provided with 10,000 or more hooks. Of the nets now in use the most important are the seine, the drift, the trawl, the weir and the trammel nets (see *NET*).

In a broad sense, the term *fisheries* includes the capture of various forms of water animals not included in the group of fish proper, such as sponges, corals, pearls, oysters, clams, mussels, turtles, whales and seals. (These are treated under their respective titles.) Salmon, whitefish, sturgeon, trout, pike and perch are among the most important fresh-water fish, and the herring, cod, haddock, mackerel and halibut take high rank among sea fish.

Fisheries have generally been considered so important a factor in national wealth that governments have been careful to protect and encourage them in various ways. The right to various fisheries has often been a matter of international dispute, negotiation and treaty. Fisheries belonging to particular governments, especially inland fisheries in lakes and rivers, are also frequently protected by laws relating to the mode and time of capture, which vary with the particular circumstances.

United States. Canada and the United States together produce about one-fifth of the world's recorded output of fish, and the annual catch from their waters has a total value of nearly \$190,000,000. The annual value of the American catch, including Alaska and outlying possessions, is over \$115,000,000. Fish to the value of \$25,000,000 are shipped out in a year from American ports. The capital invested in American fisheries is about \$75,000,000, and the industry gives employment to 130,000 persons. The yearly value of sea foods turned out by canneries is \$125,000,000.

The waters along the New England states have been worked since colonial days, and

Outline on Fishes

I. GENERAL DESCRIPTION

Form of body

Blood

Heart

Gills

Fins

Scales

Vertebrae

Bladder or sound

Coloring

(a) Deep-sea

(b) Fresh-water

Eggs

(a) Where laid

(b) How cared for

(c) Number

II. PRINCIPAL PRODUCERS

(1) United States

(a) Massachusetts

(b) Virginia

(c) New York

(d) Other states

(2) Japan

(3) Great Britain

(4) Russia

(5) France

(6) Canada

(7) Sweden and Norway

III. FISHERIES IN THE UNITED STATES

(1) Government control

(a) By national government

(1) Bureau of Fisheries

(b) By states

(2) Divisions

(a) New England

(b) Middle Atlantic

(c) South Atlantic

(d) Gulf states

(e) Great Lakes

(f) Mississippi River

(g) Pacific coast

(h) Alaska

(3) Products

IV. FISHING INDUSTRIES

United States

Great Britain

Canada

V. SALT-WATER FISH

Cod

Herring

Halibut

Mackerel

Haddock, etc.

VI. WATER ANIMALS (NOT FISH PROPER)

Corals

Pearl Oysters

Whales

Turtles

Sponges

Seals

VII. FRESH-WATER FISH

Salmon

Trout

Whitefish

Sturgeon

Eel

Pickarel

Bass, etc.

VIII. FISHING DEVICES

Set line

Seine net

Drift net

Trawl net

Weir net

Trammel net

Questions on Fish and Fisheries

How do fish rank in intelligence among back-boned animals? In economic importance?

How do fishes breathe?

Is their blood like that of human beings?

Where are highly colored fish found?

At what season do these colors increase in brilliancy and beauty?

How many kinds of fish are known to exist now? Have you any idea how many are extinct?

What are some of the differences between the characteristics of deep-sea fish and of fresh-water fish?

Where are some of the richest fishing grounds of the world?

What is fish culture? Why is it necessary?

What is meant by a "set" line?

What proportion of the world's fish crop is obtained by the United States and Canada?

they are the country's chief areas for the pursuit of cod, mackerel, haddock, hake, halibut, pollock, cusk, herring, tilefish and swordfish. Gloucester (Mass.) and Boston are the chief ports of the New England fisheries, which require a fleet of over 400 vessels. The Middle and Southern Atlantic coast waters are valuable areas for the capture of the Spanish mackerel, bluefish, tarpon, alewife, smelt and menhaden; the Great Lakes, of whitefish, lake trout, lake herring, wall-eyed pike, black bass, perch and sturgeon; the Mississippi Valley waters, of a wide variety of river fish; and the Pacific coast waters, of salmon, shad and tuna fish, or tunny.

Canada. The value of the annual catch of the Dominion is about \$55,000,000. The coast line of the Atlantic provinces, from the Bay of Fundy to the Straits of Belle Isle, measures over 5,000 miles. Along this stretch are many natural harbors, in many of which valuable fish are taken with little effort. The Atlantic fisheries may be subdivided into two distinct classes: the deep-sea, and the inshore or coastal fisheries. Deep-sea fishing is carried on in vessels usually from forty to 100 tons. The fishing grounds are off the Grand Banks of Newfoundland, twenty to ninety miles from the coast. Trawling with hook and line, with herring and squid as bait, is the customary method of fishing. Cod, haddock, hake, pollock and halibut are the principal varieties caught. The inshore or coastal fisheries are carried on in smaller boats, with crews of two or three men, using nets, hand-lines and trawls. The principal fishes taken, in addition to those already mentioned, are herring, mackerel, shad, smelt, flounder and sardine.

On the Pacific coast salmon is the most valuable catch, but an extensive halibut fishery is carried on in the northern part of British Columbia. The salmon fisheries yield a more valuable product than any other item. Herring are abundant and provide a plentiful supply of bait for the halibut fisheries.

In addition to the immense salt-water fishing area, the fresh-water area includes 220,000 square miles, abundantly stocked with many food fishes. In this connection the reader may be surprised to learn that the Canadian waters of the Great Lakes—Superior, Huron, Erie and Ontario—form only one-fifth of the total area of fresh-water lakes of Canada. The principal fishes caught

are whitefish, trout, pickerel, pike and sturgeon. Fresh-water herring are found in Lake Erie and Lake Ontario.

Fish Culture is carried on systematically in all countries having important fisheries. It includes the breeding, rearing, distribution and protection of water animals to insure their maintenance and to increase the supply of useful species. There are many fish hatcheries in Europe, most of them under private control. The Bureau of Fisheries, a division of the Department of Commerce, maintains an extensive service in the protection of fishing waters from pollution and in restocking lakes and streams. Many hatcheries are maintained where eggs are collected and hatched. The activities of the Bureau include supervision of the pearl-button industry, propagation of lobsters, oysters and clams, the fur-seal service and a variety of marine investigations.

Related Articles. Descriptive articles on the numerous species treated in these volumes will be found under the following headings:

Alewife	Halibut	Sardine
Angler	Herring	Sawfish
Archerfish	Hippocampus	Sculpin
Bass	Jewfish	Shad
Bluefish	Lamprey	Shark
Candlefish	Lantern fish	Skate
Carp	Lumpfish	Smelt
Catfish	Mackerel	Sole
Cod	Menhaden	Sprat
Devilfish	Mullet	Stickleback
Dogfish	Muskellunge	Sting Ray
Eel	Paddlefish	Sturgeon
Electrical Fish	Perch	Sucker
Flatfish	Pickering	Sunfish
Flounder	Pike	Swordfish
Flying Fish	Pilot Fish	Tarpon
Gar	Pipefish	Torpedo
Goldfish	Pompano	Trout
Grayling	Ray	Tunny
Gurnard	Ribbon Fish	Turbot
Haddock	Salmon	Whitefish
Hake	Salmon Trout	Wolf Fish

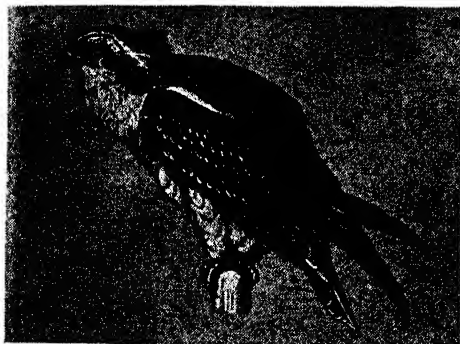
FISHER, DOROTHY CANFIELD (1879–), an American author, was born at Lawrence, Kans. She graduated from Ohio State University in 1899, and received the Ph.D. degree from Columbia in 1904. In 1907 she was married to John R. Fisher. Widely traveled and observant, Mrs. Fisher showed a special talent for character delineation in her novels, mostly of life in small communities. Among her principal works are: *The Squirrel Cage* (1912); *Mothers and Children* (1914); *The Bent Twig* (1915); *Home-Fires in France* (1918); *The Brimming Cup* (1921); *The Home Maker* (1924); *Her Son's Wife* (1926); and *The Deepening Stream* (1930).

FISHER, HARRISON (1875–1934), an American illustrator who won great renown through his attractive studies of the Amer-

ican girl. He made thousands of pictures, showing many different types of his favorite subject. His work appeared in many of the popular magazines, such as *The Saturday Evening Post*, *McClure's*, *Ladies' Home Journal* and *Scribner's*. Fisher was born in Brooklyn and educated in San Francisco. A series of his American girl drawings have been collected in a volume entitled *The Harrison Fisher Book*.

FISHER, IRVING (1867-), an American economist and professor in Yale University, who was conspicuous as a member of President Roosevelt's conservation commission in 1912. Fisher completed his preparation for teaching in Berlin and Paris in 1893-1895. He was called to Yale in 1898. One of his important books is *Elementary Principles of Economics*.

FISH HAWK, the popular name in America of the osprey, bald buzzard, or fishing eagle. It is found on both the European and American continents, near the shores of the sea or on great rivers and lakes. It nests in high trees and cliffs and lives on fish, which it captures by pouncing upon them as they swim near the surface. The general body color of the bird is a rich brown. The tail is banded with brown and white, except that of the old bird, which is pure white. The upper parts of the head and neck are whitish; a brown strip extends from the bill down each side of the neck. The under



OSPREY

parts of the body are whitish, but the legs have a bluish cast. The fish hawk is about two feet in length and measures four feet from tip to tip of its wings. It is said that the American bald eagle often pursues the fish hawk and frightens it into dropping its prey, which the eagle thereupon seizes and eats.



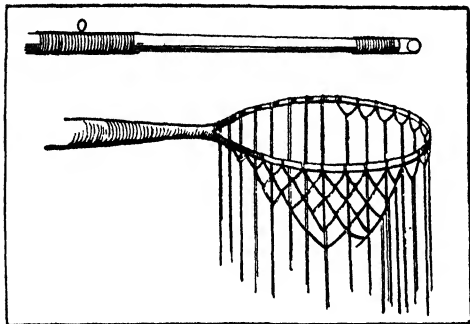
FISHING, or ANGLING.

"If I might be judge, God never did make a more calm, quiet, innocent recreation than angling," wrote Izaak Walton over 200 years ago. This famous old fisherman in a few words has voiced the sentiment of all those who think of catching fish as a game rather than a vocation. That the love of this sport is a very old sentiment is proved by various allusions in Greek and Latin writings. As early as 1496 a book was published in England on the subject, and Walton's classic on angling—*The Compleat Angler*—appeared in 1653. Of it Charles Lamb wrote, "It would sweeten a man's temper at any time to read it." To-day the sport of angling needs no defense or encouragement. It has held its place even more surely than hunting, and interest in it shows no signs of abating.

The Fisherman's Devices. Every fisherman must have a fishing-rod. To make one is an easy matter. First secure a long, straight, elastic pole. Then secure some pins and a small piece of wire. File off the heads of the pins, bend them in the shape of the letter U and drive them in the rod on the same side at regular intervals, beginning about two and one-half feet from the handle. Drive the pins just far enough to permit the line to pass freely under the loop. For the tip use the piece of wire bent into the form of a loop and bind it to the end of the pole. If there is enough wire on hand it is better to use it instead of pins. Loop pieces about three inches long and with more wire or strong waxed thread bind them to the rod, as shown in the sketch below.

A large wooden spool, an old tin can and a thick wire will serve to make a first-class reel. Run the wire through the spool and wedge it tightly so that it projects for one inch at one end and three inches at the other. From the side of a tin can cut a piece in the form of a cross. At equal distances from the ends punch a hole in each of the short arms, which should then be put upwards to form supports for the axle. Insert the ends of the

wire in the holes so that the spool revolves freely, and then bend the long end of the wire in the shape of a crank. Bend or hammer the tin over the rod until it fits it snugly. The reel may be screwed to the rod or kept in place by wire rings slipped over each end of the tin.



POLE AND LANDING NET

The *line* is usually made of firmly twisted fine silk. To the end of this may be tied a piece of fine gut, on which the hook or hooks are fixed. For casting heavy bait the line is a little heavier and the gut leader is discarded. The *hook* of finely tempered steel should readily bend without breaking and yet should retain a sharp point. It should be long in the shank and deep in the bend and the barb should be long. In size and shape the hooks must be adapted to the kind of fish that are angled for. In still fishing, *floats* formed of cork, goose and swan quills, are often used to buoy up the hook so that it may float clear of the bottom. For heavy fish or strong streams a cork float is used; in slow water and for lighter fish, a quill float.

Baits may consist of a great variety, natural or artificial. The principal natural baits are common garden worms, insects or small fish (as minnows). The artificial flies so much used in angling for trout and salmon are made of hairs, furs and wools of every variety, mingled with pieces of feathers and secured together by plaited wire, gold and silver thread, marking silk or wax. The wings may be made of the feathers of domestic fowls, or any others of a showy color. Some angling authorities recommend that the artificial flies should be made to resemble as closely as possible the insects on which the fish is wont to feed, but experience has shown that the most capricious and unnatural combinations of feather and fur have been often successful where the most artistic imitations

have failed. Artificial minnows and spoon-shaped pieces of metal are also used by way of bait, and are so contrived as to spin rapidly when drawn through the water in order to attract the notice of the fish.

A good landing net may be made from a forked stick and a piece of mosquito netting. Almost every tree will have several branches which may be used for this purpose. Bend the two ends until they overlap and then bind them tightly with waxed twine. Sew the netting into the form of a bag and fasten the open end to the loop formed by the forks. A better net may be made by using heavy wire for the loop. This can be firmly bound to the forks by lighter wire. The best way is to bend the wire into a loop and twist the ends together, as shown in the illustration. For a handle one may use an old broom stick, or any similar rod, into one end of which a hole has been bored just large enough to allow the wire to be firmly wedged in. For the net use twine; the process is not so easy, but the net will be better. First fasten the pole in a handy place, with the loop as high as the shoulder. Cut a number of pieces of twine about eight feet long. Double each piece and slip it on the loop with the loose ends hanging down. Hang these strings at short intervals all around the loop; the distance apart determines the size of the mesh, that is, the openings in the net.

To make the net take a string from each adjoining pair and make a simple knot of them, as shown in the diagram. Continue all the way around the loop, knotting the strings in this way. Now begin on the next lower row, putting the second row of knots as far below the first row as that row was below the rim. Of course the mesh may be of any size you desire. Now take the third row, and so on until you think the net ought to begin to taper or narrow down. This is done by knotting the strings a little closer together and also by cutting off one string of a pair at four equally distant points in the same row; that is, only four strings are cut. Then continue knotting until you come to one of the cut strings; here take a string from each side of the cut line and knot all three together, being careful to make it come even with others in the same row. Cut off the single string just below the new knot, but be sure it is the right one.

Fishing, as an industry, is treated in the article Fish and Fisheries.

FISHING LAWS. See **GAME LAWS.**

FISKE, JOHN (1842-1901), an eminent American historian, lecturer and philosopher, born at Hartford, Conn. As a boy Fiske was noted for his precocity; he could read and enjoy Shakespeare and Milton at eight; and before he was thirteen he knew Vergil, Tacitus, Horace and other Latin authors well. He was graduated from Harvard and from the Harvard Law School, but never practiced law. From 1869 to 1879 he was connected with Harvard University in one way or another, occupying the positions of lecturer in philosophy, instructor in history and assistant librarian. He resigned the librarianship in 1879 to deliver a course of lectures on American history at Old South Church. He gave the same course later in England, which he had visited in 1873-1874 while on a year's absence for study abroad. In 1884, after his return to America, he became professor of American history in Washington University, Saint Louis.

Fiske was early attracted by the writings of Darwin and Herbert Spencer, whom he had met while in England, and he became one of the strongest advocates of the theory of evolution. One of his earliest works, *Outlines of Cosmic Philosophy*, was based on this doctrine. For more than thirty years he expounded their theories through his lectures and writings, among the latter being his *Darwinism and Other Essays*. He is considered to have contributed more than any other American writer towards making the ideas of these great thinkers understood.

Fiske ranks among the foremost historians of his time. By his exhaustive study he contributed much of value to American history. His style is exceptionally clear and attractive, and his writings are sympathetic. In some respects, however, his work is not authoritative, on account of his patriotic prejudices. His best known historical works are *Civil Government of the United States*, *A United States History for Schools* and *The Critical Period of American History*.

FISKE, MINNIE MADDERN (1865-1932), a foremost American actress, was born in New Orleans. Her parents were connected with the theater and she was on the stage from her early childhood, achieving a real success when she was but thirteen years old. Three years later she appeared as a star, but although she won some success she gave little evidence of her real talent. After her mar-

riage to Harrison Gray Fiske in 1890, she retired from the stage for three years, and on her return to it was at once successful. She played in her husband's *Hester Crewe*, Ibsen's *A Doll's House*, and in 1897 in *Tess of the D'Urbervilles*, in which she created a great sensation. Among her plays since that time have been *Little Italy*, *Frou-Frou*, *Magda*, *Becky Sharp*, *The Unwelcome Mrs. Hatch*, *Leah Kleschna*, *Salvation Nell* and *Erstwhile Susan*. Becky Sharp was considered her greatest rôle.

FISK UNIVERSITY, an institution for the higher education of colored people, situated at Nashville, Tenn. The university was founded by the American Missionary Society and Western Freedmen's Aid Association in 1865. The university comprises normal, college, preparatory, music and industrial departments. It has an attendance in normal years of about 500 students, and a faculty of about fifty. There are over 11,860 volumes in the library. The university property is valued at about \$350,000.

FITCH, JOHN (1743-1798), an American inventor, born in East Windsor, Conn. His claim to the invention of the steamboat is upheld by some people. At the outbreak of the Revolutionary War he became a gunsmith in the American army and after this was employed in several surveying and trading expeditions in the West. He later moved to Pennsylvania, where in 1785 he completed a model of a steamboat. His second boat made a successful trial trip two years later on the Delaware. In the summer of 1790 a boat built by him made regular passenger trips between Philadelphia and Burlington, with a speed of eight miles an hour. In spite of the success of his invention, Fitch was unable to get funds to carry out his plans, and he went to France, where he was to construct boats for the government, but he was unsuccessful in getting the appointment and returned to the United States. In 1817 a committee of the New York legislature decided that he was inventor of the steamboat. See **FULTON, ROBERT**.

FITCH, [WILLIAM] CLYDE (1865-1909), an American playwright, born in New York and educated at Amherst College. His first play, *Beau Brummel*, was produced by Richard Mansfield in New York City in 1890 with great success. Besides a large number of original dramas, chiefly of modern society, he adapted many plays from the French and

German. Of his original plays, *Nathan Hale*, *The Climbers*, *Barbara Friesthie*, *Captain Jinks of the Horse Marines*, *Her Own Way*, *The Woman in the Case*, *Her Great Match* and *The City* proved popular. Of his adaptations, the best known are *Sapho*, *The Masked Ball* and *Cousin Billy*.

FITCHBURG, MASS., one of the county seats of Worcester County, fifty miles northwest of Boston, on a branch of the Nashua River and on the Boston & Maine railroad. There is a Fitchburg and Leominster airport. There are granite quarries in the vicinity, and the manufactures include paper, gingham, engines, electrical appliances, machinery and tools. Thousands find employment in the town's factories. The Fitchburg State Teachers College is located here; there is also a state armory, a Federal building, a courthouse, a library and hospitals. Population, 1920, 41,013; in 1930, 40,692. The city has about 10,000 French and the largest Finnish population of any city in the United States.

FITZGERALD, *fits jer'ald*, EDWARD (1809-1883), an English poet and translator, whose fame is due almost wholly to his translation, from the Persian, of the *Rubaiyat* of Omar Khayyam. He was of Irish ancestry and was born in Suffolk, where he spent his life in quiet seclusion. He was educated at Trinity College, Cambridge, and early devoted himself to literary pursuits and the companionship of close friends. His extreme modesty prevented him from publishing many admirable works and doubtless deterred him from writing, except when impelled by irresistible inspiration. His translation of the *Rubaiyat* appeared in 1859 and was practically his last great effort. It is a very free translation, but reproduces the spirit of the poem with faithfulness and in a style remarkable for exquisite delicacy of workmanship.

FIUME, *fyoo'me*, a seaport town at the head of an inlet of the Adriatic Sea, about forty miles southeast of Trieste. From 1870 to 1918 it formed a political division of the kingdom of Hungary, but was geographically a part of Croatia. When, at the close of the World War (1919), Austria-Hungary broke up into various independent states, Fiume was claimed both by the new Jugo-Slavic kingdom and by Italy. The ultimate destiny of the town was decided by the peace conference in Paris, in May, 1919.

It was announced that Fiume would be made a free city, because conflicting demands of the Jugo-Slavs and Italians could not be reconciled. This determination Italy deeply resented; D'Annuncio at the head of Italian troops took the city, determined to hold it for Italy. In January, 1924, Fiume was annexed to Italy.

Fiume has a picturesque situation in a region of great scenic beauty. It consists of an old town and a new one, the latter built along the seashore and possessing wide streets and handsome buildings. Next to Trieste, Fiume is the most important seaport on the Adriatic, and over 16,000 vessels enter its harbors annually. The place is also an important manufacturing center and has prosperous tunny fisheries. Population 1931, 52,928.

FIVE CIVILIZED TRIBES, the name commonly used by the government to designate five tribes of Indians which formerly lived under tribal condition in the Indian Territory (now a part of Oklahoma). They were for a long time practically independent republics, under the care of the United States, but in 1898 a law was passed establishing a commission to allot the lands of their reservations to individual Indians. The work of the commission proceeded rapidly, and in 1901 the final roll of the citizens in the Seminole nation was approved. The Creek roll was practically complete at the same time, and a very considerable allotment of lands had been made to the Seminole. Each citizen in the Seminole nation received \$308.76, and the lands were distributed so their value should be as nearly as possible this amount. By 1907 20,000,000 acres had been divided among 75,000 claimants, and in the course of the next few years the details of allotting the land were worked out. When oil was discovered in Oklahoma, much of the land owned by the Indians became very valuable. Many of these Indians thus acquired considerable wealth, either by sale or lease of their oil-bearing farm lands. They are citizens of the United States. In 1930 there were over 92,000 Indians in Oklahoma.

Related Articles. Consult the following for information on the Five Civilized Tribes:

Cherokee	Creeks
Chickasaw	Seminole
Choctaw	

FIVE FORKS, BATTLE OF, a battle of the Civil War in America, fought April 1, 1865

about ten miles southwest of Petersburg, Va. A Federal force of about 25,000 under General Sheridan opposed a somewhat smaller Confederate force under General Pickett. It was the result of efforts on the part of both Grant and Lee to secure control of the Five Forks, which commanded the only railroad communication between the South and Petersburg and Richmond. Lee stationed a small force and resisted a strong attack by Sheridan on March 31, but on the following day the Federals, after receiving reinforcements, defeated the Confederates, who lost about 5,000 men. The Federal loss was about 1,000. The result of this battle compelled Lee to evacuate Petersburg and practically led to his surrender, which occurred early in the next month.

FIVE NATIONS, THE, a name given to a confederacy of the Iroquoian tribes, living along the Saint Lawrence and in New York and Pennsylvania. Later the Tuscarora were added to the confederacy, and in consequence they were sometimes known by the English as the Six Nations. Their organization, according to their traditions, had been established by Hiawatha, and his work was so thoroughly done that even to-day, notwithstanding all the changes that have been brought about by the white man, the confederacy still exists among the survivors. The Huron, though of Iroquoian stock, were not members of the league, but were continually at war with it. In 1609 Champlain helped the Algonquins in a war against the Iroquois, and thereby gained for the French the lasting enmity of the Five Nations. As a result most of the tribes fought for the English in the French and Indian War, and they also gave aid to the English in the Revolution.

*Cayuga
Huron
Iroquoian Indians
*Mohawk

*Oneida
*Onondaga
*Seneca
Tuscarora

* The tribes starred were members of the Five Nations.

FIVES. See **HANDBALL**.

FIXED STARS, those stars which appear to remain always at the same distance from one another and in the same relative position. The name comprehends, therefore, all the heavenly bodies, with the exception of the planets, their moons and the comets. See **STARS**.

FJORD, the Scandinavian form of the word *fjord* (which see).



FLAG, a symbol of nationality, rank, organization or religion. The term is most definitely associated with the emblem which represents country, with which is linked the sentiment and history of the ages. There are, however, many kinds of flags besides the Stars and Stripes, the Union Jack, the Tricolor and other national emblems. In armies different regiments have their special banners; the flags borne on the masts of vessels include those which designate the country to which they belong, and also those which denote the rank of the commanding officers. In the United States navy blue flags, with four, three and two white stars, are borne at the main, fore and mizzen, by the ships of admirals, vice-admirals and rear-admirals, respectively. Any officer commanding a vessel, except one on board of which a flag or broad pennant may be borne, flies a narrow pennant at the main. When explosives are taken on a merchant vessel, a red flag is hoisted at the fore. The President's flag is blue, and bears the United States coat-of-arms; that of the Secretary of the Navy is a flag of blue, bearing an anchor in the center of a group of four white stars.

A yellow flag is the quarantine flag. A flag reversed is a sign of distress. To lower, or *strike*, the flag is to pull it down or take it in, out of respect or submission to superiors. To strike a flag in an engagement is a sign of yielding. A sign of mourning is to hoist the flags only part of the height of the masts; if on land, half the height of the staff. Flags are a recognized means of signaling at sea, where, by international codes, ships may communicate on every necessary subject. Each nation, too, has its own private code. *Dipping* the flag is hauling it down a few feet and then running it up again. Salutes are made by dipping. In the United States navy, when the flag is hoisted at "colors," or hauled down at sunset, the officers and men are required to salute.

Flag of Truce. This is a white flag which, when exhibited by one of two opposing armies, indicates a desire to cease hostilities

temporarily for purposes of communication. It has assumed a sort of sacred character, and firing upon a flag of truce is considered among civilized nations a just cause for severe retaliation. The flag is in the nature of a message from the highest commanding officer of one force to the corresponding officer of the other. The one to whom the message is sent can refuse to receive it, and the messenger after being warned not to proceed farther, is not considered immune from attack if he disobeys this order. It is considered a violation of international law, also, to use the flag of truce for any other purpose than direct and immediate communication, and any attempt to secure private information by means of it is punishable by the severest measures.

How Flags Came to Be. It seems probable that almost as soon as man began to meet for common purposes some conspicuous object was used either as a symbol of the common sentiment or as a rallying point. In military expeditions, where organization was necessary, such objects were used to mark out the lines and stations of encampment, and to keep in order the different bands on the march or in battle. In the course of time certain standards became known as belonging to certain regiments or tribes or even nations, as the case might be. The standards of individual lords and rulers were used by their retainers; as these rulers increased their dominion their flags gradually assumed the character of national flags.

Among the remains of the earliest civilizations are records of ensigns or standards. From ancient carvings and paintings it appears that different companies of the Egyptian army had their own standards, which were generally objects of awe and reverence; sacred animals, boats, a tablet bearing a king's name, and other devices were raised on the end of a staff, and the office of carrying them was considered a great privilege and honor. Among the ancient Assyrians two distinct designs are known to have existed; one, a man drawing a bow and standing on a bull; the other two bulls running in opposite directions. Both Assyrian and Egyptian standards were frequently ornamented with flaglike streamers. The banners and standards of the Hebrews and other nations are frequently mentioned in the Bible. The Persians used the figure of an eagle fixed to the end of a lance, and sometimes the sun,

as their divinity, was also represented. Some of the North American Indians carried eagle's feathers fastened to the tips of poles.

The standards of the Greeks and Romans show greater variety. The early Greeks bore a piece of armor fastened to a spear; in later times the cities chose emblems or letters sacred to their associations; thus the Athenians the olive and the owl, the Thebans a sphinx, and the Messenians their initial M. Among the Romans a cross piece of wood was sometimes placed on the end of a spear and surmounted by a silver hand, figures of Mars or Minerva, or portraits of generals and emperors. Figures of animals, especially the wolf, horse, bear and eagle, were carried; it was not till the days of Marius that the eagle became the only standard of the legions. The emblems were guarded in the temples and the Roman soldier swore by his emblem as by his deities. Roman generals are known to have ordered a standard cast into the ranks of the enemy, in order to rouse their soldiers to a fiercer attack for the recovery of what to them was perhaps the most sacred thing on earth.

The earliest flags were almost purely of a religious character. In fact, the aid of religion seems to have been sought to give sanctity to national flags, many of which can be traced to a sacred banner, as the oriflamme of France and the Dannebrog of Denmark. The story goes that King Waldemar of Denmark, while leading his troops to battle in 1219, at a critical moment saw a cross in the sky. It was forthwith adopted as the emblem of Denmark and called the "Dannebrog," that is, the strength of Denmark.

The standards of the early kings of France bore the blue hood of Saint Martin; later the oriflamme, the emblem of Saint Denis, was substituted. Similarly the cross of Saint George was used in England, the cross of Saint Andrew in Scotland, and the cross of Saint Patrick in Ireland. See **FLAGS OF THE BRITISH EMPIRE**.

Flag of The United States. On June 14, 1777, the American Congress passed the following resolution: "That the flag of the Thirteen United States shall be thirteen stripes, alternate white and red, and that the union be thirteen white stars on a blue field." With this resolution a new national emblem had its birth, one destined to become the flag of one of the greatest nations in history. The first flag is said to have been made by Mrs.

Outline on Flags

I. MEANING OF THE TERM

II. USES

- (1) Primary
 - (a) Rallying point in battle
 - (b) Emblem of nationality
 - (c) Religious emblem
- (2) Secondary
 - (a) To distinguish divisions of army in war
 - (b) To denote rank of officers in army and navy
 - (c) Private emblems
 - (d) Signs or signals
 - (1) Quarantine
 - (2) Flag of truce
 - (3) Sign of distress
 - (4) Sign of respect to superior officers
 - (5) Mourning
 - (6) Signals at sea
 - (7) Salute
 - (8) Danger

III. HISTORY

- (1) Ancient Standards
 - (a) Egyptian
 - (b) Assyrian
 - (c) Persian
 - (d) Greeks
 - (e) Roman
 - (1) Eagle for infantry
 - (2) Cavalry emblems
 - (3) Imperial
- (2) Medieval flags (of cloth)
 - (a) Religious
 - (b) Knightly
- (3) Modern national flags
 - (a) England
 - (b) Germany
 - (c) France
 - (d) Mexico
 - (e) Italy
 - (f) Spain
 - (g) United States
 - (1) Origin of national flag
 - (a) Colonial flags
 - (b) Washington's coat-of-arms
 - (c) The flag of Betsy Ross
 - (d) Flag of 1818

Questions on Flags

What were the primary uses of flags and standards?

What became the standard of the Roman legions?

How do we know that different companies of the Egyptian Army had their individual standards?

Were you to see a United States warship, how could you determine the rank of the officer in charge?

Who made the first American flag? Which navy first saluted the American flag?

What was the first recorded naval engagement under the flag? When were the colors first unfurled over a foreign country?

What flag is used by the Governor-General of Canada?

What was the United States national emblem during the War of 1812?

Who wrote "The Star-Spangled Banner"? Who has the flag that inspired that song?

When did the American flag have sixteen stars and fifteen stripes?

Why has the American flag thirteen stripes? Who suggested the number of stripes?

When was the revenue flag created?

What is the color of the flag of the President of the United States?

What device is borne by the flag of the Secretary of the Navy?

What flag is hoisted when powder is taken on board?

What is the meaning of a flag reversed?

What is the flag of truce? What does the expression mean, to "strike the flag"?

How are flags hoisted in case of mourning? What is "dipping the flag"?

Why should love for the flag of one's country be taught to every child?

In battle, why is the standard bearer in an especially dangerous position?

Why were early flags of a religious nature?

What legend is told about the flag of Denmark?

Elizabeth Ross, 239 Arch Street, Philadelphia (see ROSS, BETSY). The Betsy Ross flag had the stars arranged in a circle, and, as now, the stars were five-pointed. The French navy saluted the American flag February 14, 1778, when it floated from the mast of the *Ranger*, commanded by John Paul Jones.

The first recorded naval engagement under the flag was between the *Ranger* and the *Drake* (English), April 24, 1778. At Fort Stanwix (now Rome), N. Y., upon the enemy appearing unannounced on August 3, 1778, a flag was hastily constructed out of strips of sheets and bits of scarlet cloth sewed together, while out of Capt. Abraham Swartout's camlet cloak was constructed the field for the stars. The Stars and Stripes were associated with all the glory of the last days of the Revolution and waved in prophetic splendor over Yorktown. The first time colors were unfurled over a foreign country was when Capt. John Rathburne took possession of Fort Nassau, New Providence Island. The American colors were first shown in a British port by the ship *Bedford*, of Nantucket, reporting at the customhouse, London, February 6, 1783.

The national emblem during the War of 1812 had fifteen stars and fifteen stripes, the number having been increased by an act of Congress on the admission of Vermont and Kentucky, 1795. The descendants of Colonel Amstead possess the flag whose "broad stripes and bright stars" inspired the *Star Spangled Banner*, written by Francis Scott Key. On the admission of Indiana in 1816, a committee was appointed to inquire what changes were necessary to be made. At the suggestion of Capt. S. C. Reid the number of stripes was reduced to the original thirteen, and the stars increased to represent the number of states. By the following enactment, April 4, 1818, the present status of the flag was fixed:

"Resolved, That from and after the 4th of July next, the flag of the United States be thirteen horizontal stripes, alternate red and white; that the union have twenty stars, white in a blue field; that on the admission of every new state one star be added to the union of the flag, and that such additions shall take effect on the 4th of July next succeeding such admission."

Flag Day. On June 14, 1777, the Congress, then sitting in Philadelphia, passed the first resolution respecting the flag of the

United States, declaring that it should be "thirteen stripes, alternate red and white, and . . . the Union be thirteen white stars on a blue field." Today this date, June 14, is observed throughout the nation as Flag Day. Appropriate exercises are held in schools, flags are displayed in homes, and are hoisted outdoors on standards. In some states Flag Day is a legal holiday.

FLAGEOLET, *flaj'olet*, a small wind instrument of music, played by means of a mouthpiece and finger holes. The tone produced is shrill, but is soft in quality.

FLAGG, JAMES MONTGOMERY (1877-), an American illustrator, portrait painter and author, born at Pelham Manor, N. Y. He studied at the Art Students' League, New York City, also in England and in Paris. Flagg has published a number of volumes of poetry and prose, illustrated with his own drawings. He was illustrator for *Saint Nicholas*, *Judge*, and *Life*, a portrait painter in Paris and New York, exhibiting at the Paris Salon in 1900. During the World War he designed 45 war posters. With keen insight, and with a skilful technic, he portrays faithfully the various phases of life that come within his observation.

FLAG OFFICER, the designation of an admiral, vice-admiral, rear admiral or (occasionally) a captain, in highest command of a fleet of naval vessels. As evidence of his supreme authority he flies the flag of his rank at the masthead of his vessel. See color plate, *Flags of the United States* in article FLAG.

FLAG OF THE PROPHET, the sacred flag of the Mohammedans. It was originally composed of the turbans of the Koreish, captured by Mohammed; but the black curtain that hung in front of the door of Ayesha, one of Mohammed's wives, was afterward substituted. It is preserved in the seraglio at Constantinople. The carefully guarded banner unfolded at the commencement of a war is not the real sacred flag, though it is commonly believed to be so.

FLAGS OF THE BRITISH EMPIRE. The national flag of the British Empire is the Union Jack, in which the crosses of Saint George, Saint Andrew and Saint Patrick are combined. When the crowns of England and Scotland were combined under James I, he issued a proclamation that the flag of a man-of-war should be the "red cross commonly called Saint George's cross, and the

white cross commonly called Saint Andrew's cross, joined together according to a form made by our heralds, and sent by us to our admiral to be published to our said subjects." This was the first Union Jack; strictly speaking, it should be called the "Great Union," and it is only a "jack" when flying from the jackstaff of a man-of-war. Probably the name of the king, "Jacques," the French for James, gave the name to the flag and then to the staff on which it was hoisted. Various changes were made by Cromwell and by Charles II, and in 1801, after the legislative union with Ireland, the cross of Saint Patrick was added, so that the arrangement of the three crosses now in use was adopted.

The Union Jack is the most important of all British flags and is flown by representatives of the empire all over the world. With the Irish harp on a blue shield in the center, it was flown by the Lord Lieutenant of Ireland. The star and arms of the order of the Star of India indicate the flag of the Governor-General. Colonial governors use it with the arms of their colonies in the center. With the royal arms in the center it is used by the British government's diplomatic representatives and also as a military flag, flown over fortresses and headquarters. When it is hoisted at the mainmast of a man-of-war it is a sign that the admiral of the fleet is on board.

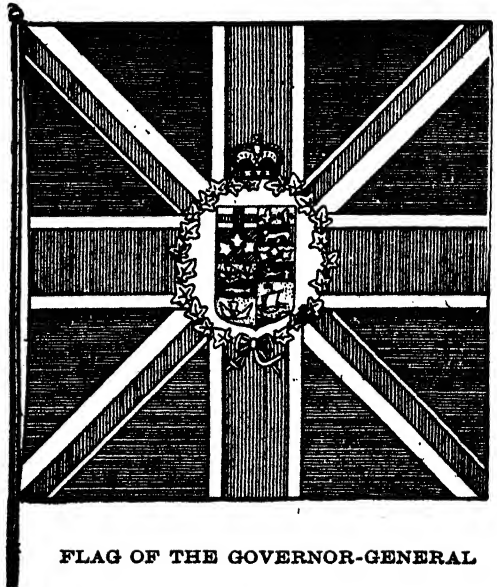
The royal standard is divided into four quarters. The upper left-hand and lower right-hand quarters have three lions in gold on a red field; these are for England. In the upper right-hand quarter there is a single lion within a frame, both red on a field of gold. The golden Irish harp on a blue field is in the lower left-hand quarter.

The three ensigns—the red, the white and the blue—were originally all naval. In the days of huge fleets, such as that which met the Armada, there were three admirals, each with his special ensign. The admiral in command used a plain red flag. The vice-admiral, who generally commanded the van, used a white flag, and the rear-admiral a blue one. All these three flags later bore the combined crosses of Saint George, Saint Andrew and Saint Patrick, and until 1864 they were used only by the royal navy. By a change in the regulations in that year, the navy retained only the white ensign, the mercantile marine was allowed to use the red ensign and the blue ensign was given to all

vessels on public service except those of the navy. For the various departments of government, special devices are used; for instance, the telegraph uses a blue ensign on which is represented Father Time with his hour-glass shattered by lightning.

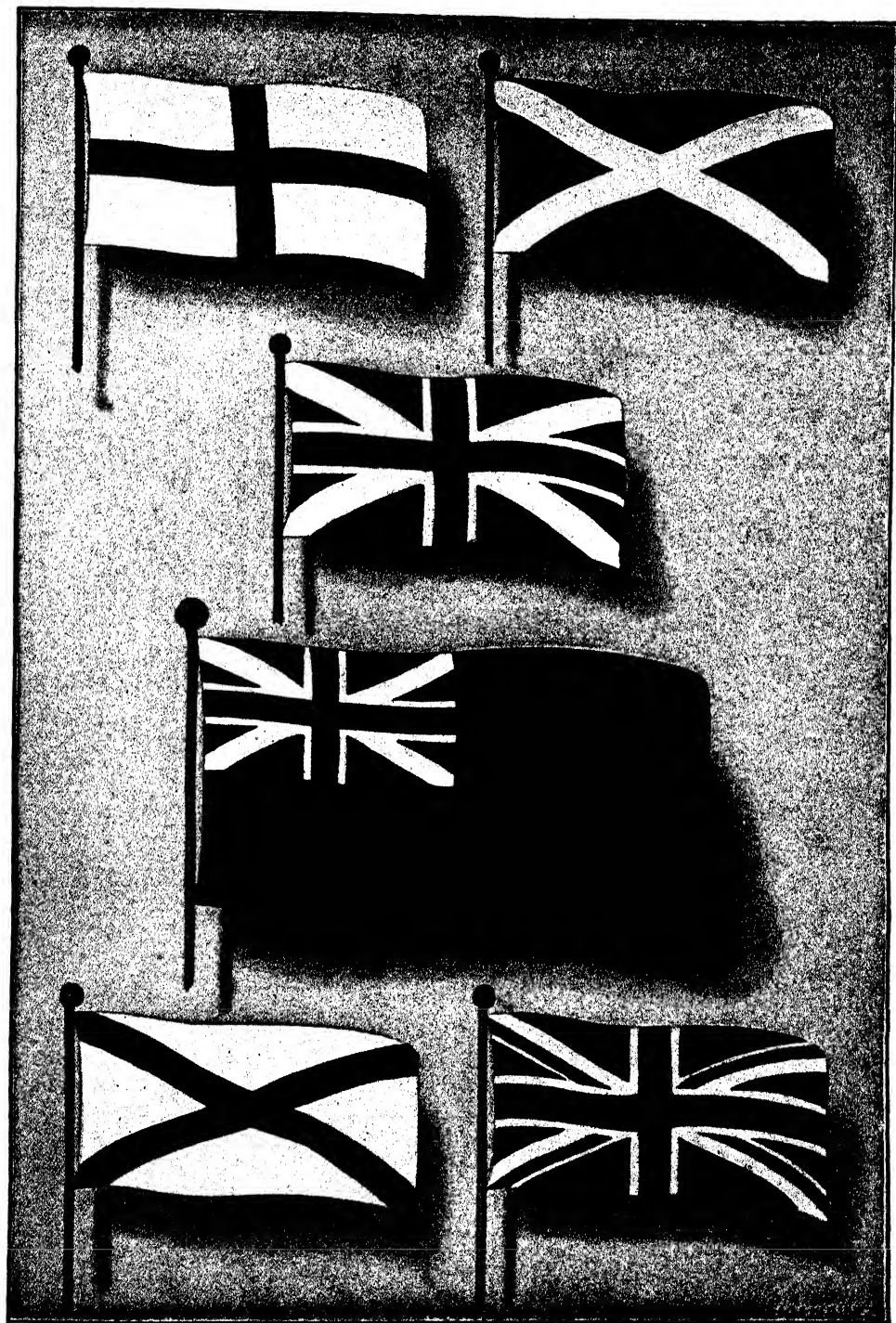
The Union Jack is flown from all fortresses and garrisons of Canada, under the charge of the colonial militia authorities. The Dominion also has authority to display on all public occasions a national flag. This is the red or blue ensign with the Union Jack in the upper corner next to the mast and the Dominion coat of arms in the field. The red ensign is used at the opening and closing of Parliament and on national occasions of any sort. As in England, the blue flag distinguishes the government vessels.

The governor-general uses a plain Union Jack with the Dominion coat of arms surrounded by a garland of maple leaves and surmounted by a crown. The Union Jack is flown at the government house at Ottawa and at the provincial capitols on ordinary occasions. On the King's birthday and on the days of his accession and coronation the royal standard is flown. The lieutenant-governor of each province has a flag displaying the provincial arms surrounded by a wreath of



FLAG OF THE GOVERNOR-GENERAL

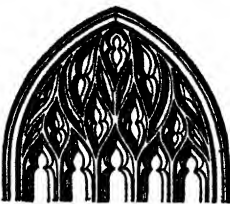
maple leaves on the white ground of the Union Jack. For illustrations of these flags, see the articles on the different provinces.



THE BRITISH FLAG

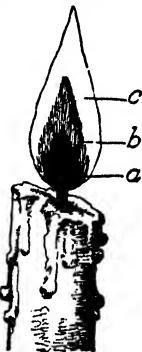
1—English Jack, Cross of St. George. 2—Scotch Jack, Cross of St. Andrew. 3—Crosses of St. George and St. Andrew, combined to make the Union Jack of Queen Anne, 1707. 4—Red Ensign of Queen Anne. 5—Irish Cross of St. Patrick. 6—Present Union Jack, a combination of the Union Jack of Queen Anne and the Irish Cross of St. Patrick.

FLAMBOYANT, a style of Gothic architecture common in France from the fourteenth century to the sixteenth, so called because of the flamelike forms of the tracery of windows, wall panels and other details. While it was accompanied by a profusion of ornament and decorative carving which often ran into extravagances, the fundamental principle of the flamboyant style with its rhythmic flowing lines as distinguished from the geometrical designs preceding it was a most important contribution to architectural design.



FLAMBOYANT
TRACERY

FLAME, a blaze rising from a burning body, or any inflammable gas in a state of visible combustion. Flame is attended with great heat and sometimes with the evolution of much light, but the temperature may be intense with little light, as in the case of the flame of burning hydrogen. The luminosity of flame depends upon the presence of extremely small particles of solid matter (usually carbon) or of dense gaseous products of combustion. The flame of a candle consists of a dark colored cone containing gases that look dark because they are not burning, a white envelope surrounding the cone and consisting of particles in a high state of combustion, and a second and outermost cone of yellow color, in which particles of matter are heated to the point of burning (see *a*, *b* and *c*, in the illustration). When the pressure of the gas producing the flame is so great that it is all but flaring, it is found that certain sounds will cause the flame to alter its shape, thus producing *sensitive flames*.



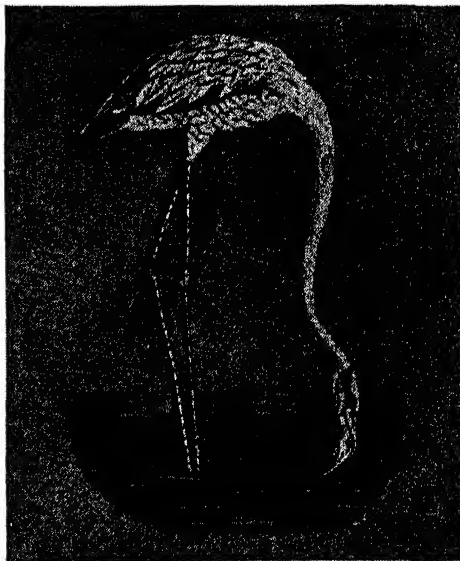
FLAME

- a*, area of no combustion.
- b*, area of partial combustion.
- c*, area of complete combustion.

FLAMINGO, a strange-looking bird, whose body is rather smaller than that of the stork, but which, owing to its great length of neck and leg, measures from five to six feet from head to foot. There are several different species found in Mediterranean and tropical countries, all more or less red in color, but

varying in size. They migrate in V-shaped flocks. Their necks are extremely slender and flexible, and their big, naked bills are bent abruptly down, as if broken near the middle. In feeding, the bird stands nearly erect, thrusting its neck downward and burying its bill and perhaps its head in the water, with the top of the bill downward. It then sways its head from side to side, causing currents of water to pass back and forth through the bill, where fine horny projections strain out the seeds and the small animals that are stirred up from the bottom by the bird's feet. The birds nest in the warm countries in large colonies, upon muddy flats near the water level. Their nests are big cones of reeds and sticks, cut off squarely at such a height that the mother bird can sit with her legs dangling down the sides, though she usually sits with them folded up beneath her.

The flamingo of North America nests in the latitude of Florida. The male has a light red plumage, whose large feathers have black quills; the females are pale pink and the young nearly white. As is the case with other beautiful birds, their handsome plumes made them sought by hunters, and laws have been passed for their protection.



FLAMINGO

FLAMINIAN WAY, the principal northern road which led from ancient Rome. It was constructed by Caius Flaminius the elder,

in 220 B. C., during his censorship, and led from Rome to Ariminum on the Adriatic, 222 miles. Remains of it are yet extant in various places.

FLAMMARION, *fla mah re ohn'*, CAMILLE (1842-1925), a French astronomer and author of several scientific books, many of which are written in a popular style. In his youth he studied theology and many of his books are tinged with mysticism. He has written several astronomical and spiritualistic romances. *The Unknown and Psychic Problems* and *Mysterious Psychic Forces* are typical of his style. *Astronomy for Amateurs* is an excellent book on the subject, for young people. Flammarion has edited a number of scientific magazines. In 1887 he founded the Astronomical Society of France, and was elected its first president. His more solid contributions to astronomical science embrace a work on the motions of the stars, another on double and multiple stars, and a treatise on the topography and physical constitution of Mars. Among his excellent handbooks which have been translated into English are *Marvels of the Heavens*, *The Atmosphere*, *Popular Astronomy* and *Uranus*.

FLANDERS, an old geographical section comprising lands now in Belgium, adjacent departments of France, and part of Zealand, Holland, but later known only as two provinces in modern Belgium. All of the Belgian coast line is included in West Flanders, and in that region occurred some of the most desperate battles of the World War (which see). The valiantly-defended Ypres, and Zeebrugge, noted as a submarine base, are some of the historic cities of West Flanders. The people of Flanders speak the Flemish language (which see).

East Flanders has an area of 1,147 square miles. Its soil, partly of a sandy and partly of a clayey nature, is so industriously cultivated in peace times that it has the appearance of a vast garden. The principal crops are wheat and flax. Linen, laces and damask are among the important manufactures. Ghent is the capital. Population, 1930, 1,149,200; in 1933, estimated, 1,165,444.

West Flanders has an area of 1,209 square miles. The most important industry is the manufacture of linens and laces. Bruges is the capital. Population, 1930, 901,588; in 1933, estimated, 922,953.

FLANNEL, a fabric made of wool, or of worsted. wool and silk. or wool with cotton.

It is used for outer and under garments, both in cold and hot climates, because it promotes an insensible perspiration, which is absorbed by the atmosphere. The best flannels are made in Wales.

FLATFISH, a sea fish which has a flat body, with both eyes on one side of its head, and which swims on its side. Examples are the flounder, turbot, halibut and sole. The term is also applied to other fishes with flat bodies, such as the skate and other members of the ray family.

FLATHEAD, the name applied in scorn by various Western tribes to an important Salishan Indian tribe, that lived originally in Northwestern Montana. The tribes living along the Columbia River shaped the skulls of their infants by putting on each cradle a headboard of wicker which pressed the child's head into a peak. The Salish did not practice the custom of artificially deforming the head, and so earned the name *flathead*. They were a superior people, courageous but not aggressive, and fair in their dealings with the whites.

FLAX, a plant cultivated for its fiber and seed, both of which are of great commercial value. From the fiber is produced the fabric linen (which see), so widely used in making choice table cloths and napkins, towels, handkerchiefs and a great variety of articles of apparel, as well as twine, rope, cordage and sailcloth. During the World War the value of flax fiber was enhanced by the extensive production of aeroplanes, the wings of which are a strong grade of linen. In certain flax markets the fiber was quoted as high as \$700 a ton, and the belligerent governments put forth special efforts to increase its production. The seed of the plant is also valuable, as it is the source of linseed oil, used in making linoleum and oilcloth, for medicinal purposes and as an ingredient of paints and varnishes (see LINSEED OIL).

The flax plant sends up a slender stem from two to three feet in height, which branches freely when the plants are not closely crowded. The flowers of most species are a beautiful blue, but in some cases white ones are borne. The cultivation of flax demands more labor than that of almost any other crop, for every step from planting to the final preparation of the fiber must have the greatest care. If only the seed is to be used, the plants may be allowed to ripen, and may then be cut with a mower (see Figure 2



FLAX



WHAT A JUMP!

If a flea could grow to the size of a man, it could easily jump over New York's Empire State Building. Give a man the jumping power of a flea, magnified to his size, he could perform the same feat.

of the color plate); but if the fiber is to be saved the flax must be pulled by hand before it is quite ripe, for the best of the fiber is near the roots and is harmed by the cutting process (see Figure 3 of the color plate). The pulled flax is either tied together in bundles, and left upright on the field until it is dry, when the seeds are separated from it, or the separation is made immediately after the pulling, by means of an iron comb known as a *ripler*.

Next the flax is *retted*, or *rotted*, in water (Figure 4, color plate) until the fiber may be easily removed from the woody part of the stalk, and is then spread on the grass to dry. Each process, the retting and the drying, takes from ten days to two weeks. Freeing the fiber from the core requires two operations. First the *breaking* is done by means of a wooden handle and grooved board, or by revolving grooved rollers, and then the woody part is entirely separated from the fiber by a broad, flat wooden blade, called a *scutching blade*, or by a scutching machine (Figure 5, color plate) in which a number of knives attached to the arms of a verticle wheel strike the flax in the direction of its length. The flax is next *heckled*, or combed with an iron comb, the finer fibers being produced by repeated heckling, each time with a finer comb.

The chief flax-growing countries are Argentina, Egypt, British India, Russia, Holland, Belgium, Ireland, the states of the former Austria-Hungary, the United States and Canada. For several years before the World War the annual linseed production of all countries varied from 100,000,000 to 133,000,000 bushels, and that of fiber from 1,000,000 to 2,000,000 pounds. In normal years the United States produces about 23,000,000 bushels of flaxseed, while Canada's crop varies from 4,000,000 to 17,000,000 bushels. North Dakota is the leading flax state of the America Union.

FLEA, *flee*, a very small wingless insect nearly all species of which prey upon animals. The common American flea is about one-eighth of an inch long, somewhat flattened in shape and covered with a shell composed of hard, overlapping plates. Two threadlike feelers (antennae) grow out from between the eyes. The mouth parts are adapted for piercing and sucking. Fleas are not only an annoy-



FLEA
(Much
enlarged.)

ance, but they are a danger. It has been discovered that the bubonic plague (see PLAGUE) is transmitted through fleas from rats to men. So long as the rat is alive the fleas do not leave it, but as soon as a rat dies the fleas quickly forsake it and find new prey—domestic animals and human beings.

FLEABANE, *flee'bane*, a name given to several plants, from their supposed power of driving away fleas. The *common fleabane*, whose smoke was supposed to expel fleas, is found in moist, sandy places in the south of England. The *blue fleabane* is common on dry banks. In the United States it is found abundantly in all parts east of the Mississippi River. It is also called *sweet scabious*, and other species closely allied to it are the *horse-weed* and *butterweed*, or *colt's tail*. The seed is distributed by the winds and springs up in waste places and grain fields.

FLEMISH LANGUAGE, a form of Low German spoken by the inhabitants of Belgian Flanders (see FLANDERS) and sections of Holland. It bears a close resemblance to modern Dutch, but is distinguished by certain peculiarities of spelling and pronunciation. Since 1830 Flemish has become an important vehicle as a spoken and written language. It is of equal standing with French in legal and governmental circles in Belgium, is studied in the public schools, and has been used by recent novelists, poets and playwrights. A Flemish university was established at Ghent in 1886.

FLETCH'ER, FRANK FRIDAY (1855-1928), one of the admirals of the American navy. He first became popularly known when in command of United States naval vessels, as rear-admiral, at Vera Cruz, Mexico, in 1914, when trouble arose with Huerta's government (see MEXICO, subhead *History*). After being relieved of that command he became commander in chief of the North Atlantic squadron. At that time he was raised to the rank of admiral. Fletcher was graduated from the United States Naval Academy in 1875, became a captain in 1908 and a rear-admiral in 1911. During the World War his station was with the Atlantic fleet.

FLETCH'ER, JOHN. See BEAUMONT AND FLETCHER.

FLETCH'ERIZING, a method of mastication, so called because of the emphasis it has received from Horace Fletcher (1849-1919), an American writer. The most important principle in Fletcherizing is to chew one's

food until it is reduced to a liquid. By this system, according to Mr. Fletcher, the many ills of indigestion, constipation, etc., will be eliminated. He also condemned overeating and eating when one is not hungry. Some authorities claim that he overemphasized the value of thorough chewing, and that too much chewing harms the teeth. On the other hand, he rendered humanity a service by arousing public interest in the subject of mastication and nutrition, and by emphasizing the evils of bolting the food.

FLEUR-DE-LIS, *fleur de lee'*, the national flower of France, generally known as the iris. A conventionalized form of this lily, also called fleur-de-lis, was the emblem of the French kings. The plant has large, sword-shaped leaves and blossoms with six petals, three of them drooping and the other three standing upright. In color the flowers are a beautiful combination of lavender, deep mauve, yellow and white. They grow luxuriantly, both in a wild and a cultivated state.

FLEXIBILITY, the property of certain bodies by virtue of which they may be bent. It should be distinguished from *elasticity*, which is the property enabling a flexible body to resume its original position after strain has been removed. A bar of iron is flexible, but not elastic. A young sapling is elastic; if bent to the ground and then released, it springs quickly to an erect position.

FLEXNER, SIMON (1863-), an American physician who has helped to lower the death rate by his investigations in the field of infectious diseases. One of his most notable achievements was his production of a serum for treating cerebrospinal meningitis. He also announced the discovery of the germ of infantile paralysis. Dr. Flexner was born at Louisville, Ky. He received a degree in medicine at the University of Kentucky in 1889, and later studied at Johns Hopkins University and in Germany. After serving as professor of pathology in various American universities, he took charge in 1903 of the laboratories of the Rockefeller Institute for Medical Research, resigning in 1935. He was a member of scores of scientific societies throughout the world.

FLICKER, a common name for the *golden-winged woodpecker*, one of the handsomest and commonest birds of the Eastern United States and Southern Canada. Its prevailing color is olive-brown, with black markings, while the rump and upper tail coverts, which

it shows conspicuously in flight, are pure white. It has an ash-colored head and neck, the former barred by a strip of bright scarlet. The under parts are brown, fading toward the rear into yellow, and are marked with numerous round black spots. Across the breast and throat is a broad black crescent. The under parts of the tail and wings are a rich golden yellow.

The bird is not at all timid; it is frequently seen near dwelling houses and other occupied buildings. It has a loud and characteristic note which, once heard, cannot be forgotten. Almost every locality has its own favorite name for this bird. *High-holder*, *sapsucker*, *yellow-hammer*, *flicker* and *golden-winged woodpecker* are but a few of them. In the Rocky Mountains and on the Pacific coast are species varying somewhat from those of the east in color and markings.

FLINT, a very hard rock which when struck with steel produces a spark. It is a variety of quartz, and is usually of a dark bluish-gray color. It is found in rounded lumps, or nodules, in masses of other rock and is used in the manufacture of glass and fine pottery.

FLINT, MICH., the county seat of Genesee County, sixty-eight miles northwest of Detroit, on the Flint River and on the Grand Trunk and the Pere Marquette railroads. The city has more than a dozen motorbus and truck lines. The economic structure of Flint is built around the gigantic automobile industry. Next to Detroit, Flint manufactures more automobiles than any other city in the world. Here are built the Buick and Chevrolet automobiles, and there are two plants making Fisher bodies for these cars; there are numerous factories supplying almost every accessory known to the industry, among the leaders being spark plugs, instrument panels, and speedometers. The General Motors Corporation maintains an institute of technology and a proving ground. One of the largest duco finish factories in the United States is here. There are scores of other industries producing brass and aluminum castings, trailers, fabricated steel, tents and awnings, sheet metal, and the like. There are three airports, and a stadium seating 20,000. Population, 1930, 156,492.

FLOOD, a body of moving water which overflows land not usually covered with water. Flat lands on the sea coast and along the shores of rivers are, naturally,

most exposed to danger of this sort, and history from the earliest times presents a long list of disasters from floods.

Sea Floods. These are far less frequent than river floods, but are likely to cause far more damage when they do occur. The most common cause of inundations by the sea is the bursting of dykes or sea walls in those countries which are actually below sea level at time of high tide. Parts of the Netherlands, for instance, are from sixteen to twenty feet below sea level, and only great dykes along much of the coast make the country a land area instead of a water area. In past times, when the construction of dykes was not as well understood as it is to-day, there were periodic floods which were terribly destructive. In 1421, about 100,000 people were drowned and seventy-two villages were under water. Just a century later another disastrous flood killed almost 100,000, and in 1570 about 20,000 perished in Friesland. Other causes of sea inundations are unusually high tides, or severe winds which drive the waves inland. The disaster at Galveston on September 8, 1900, in which 6,000 lives were lost and 3,000 buildings destroyed, was the result of a hurricane which piled up the waters on the coast. Earthquakes, too, occasionally give rise to sea floods, the best known example of such a disturbance being the tremendous tidal wave which followed the earthquake by which Lisbon was destroyed in 1755.

River Floods. These floods result from excessive rains, the sudden melting of snow and ice, or the breaking of reservoirs and protective embankments. Floods occurring at regular periods in regions of deficient rainfall may be the means of saving such regions from reverting to desert. In Egypt the agricultural life of the people has always depended on the overflow of the Nile (which see). Another story is told in the records of river floods in the United States. Practically every section of the country having an extensive river system is visited by destructive floods at varying intervals. This statement applies to the Eastern states, the South and the Far West, but more particularly to the region of thriving cities and rich farm lands traversed by the Lower Mississippi and its tributaries.

Records of destructive floods in the Mississippi basin have been compiled for over a century. Especially disastrous were the

floods of 1912, 1913 and 1927, but what has been called the greatest inundation in American history occurred early in 1937. Unprecedented rains fell in the Ohio Valley during the first three weeks of January. The Ohio River, swollen to a record high, poured its flood waters over such populous centers as Cincinnati, Louisville and Evansville (Ind.), as well as scores of smaller communities. There was tense anxiety when the crest, thirty feet above normal, menaced Cairo, at the junction of the Ohio and the Mississippi. The protecting embankment held fast (see subhead below), and in February the great flood passed into the Gulf at New Orleans. This flood rendered a million persons permanently or temporarily homeless, took the lives of 460, and caused a property loss estimated at \$500,000,000.

Flood Prevention. From 1879 to 1928, flood control of the Mississippi was under the direction of the Mississippi River Commission. In 1928 Congress passed an act whereby the River Commission became an advisory and consulting body and the actual construction of flood-control works was placed in charge of army engineers. A new levee system was built, with a special floodway for the protection of New Orleans. See **LEVEE**.

FLOOD PLAIN, a plain formed by a river depositing sediment at its mouth or along its course. If formed in the upper or middle part of the river's course, the flood plain may be composed almost entirely of gravel and coarse sand, but the most extensive plains of this sort are formed in the lower part of the river's course and are composed of fine silt or alluvium. The flood plains in the lower course of the river or near its mouth are usually wider than those farther up stream. Since they follow the course of the stream, many of these plains are very irregular. In case of high water they may be flooded and covered with a new deposit of silt, or the current of the stream may become sufficiently strong to cut a new channel and cause serious damage. The flood plains along great rivers are usually densely populated, because of their fertility. The most noted of these plains are along the Nile, the Po, the Rhine and the Ganges. See **DELTA**; **RIVER**.

FLO'RA, the Roman goddess of flowers and spring, whose worship was established at Rome in the earliest times. Her festival, the Floralia, was celebrated from April 28 to May 1.

The term *flora* as a common noun is used in botany to designate the entire plant life of any region or period, as the *flora of Massachusetts* or the *flora of the Carboniferous Age*. The corresponding word for animal life is *fauna*.

FLORENCE, ALA., the county seat of Lauderdale County, near the Muscle Shoals dam and power plant, and on the Tennessee River and the Louisville & Nashville and the Southern railroads. The manufactures include wagons, cotton yarn and textiles, fertilizers, cottonseed oil, pig iron, meat products and carbonated beverages. There are lumbering and mining industries in the vicinity. Florence ships most of the cotton of the adjacent country. It is the seat of a state normal school and a normal school for negroes. A railroad and passenger bridge crosses the river. Population, 1930, 11,729.

FLORENCE, *flaw'rens*, ITALY, now called Firenze by Italians, celebrated as one of the great art centers during the Italian Renaissance. No other city surpasses Florence in the number of illustrious personages connected with its history. Dante, Petrarch, Boccaccio, Leonardo da Vinci, Cimabue, Andrea del Sarto, Michelangelo, Donatello, Ghiberti, Cellini, Machiavelli, Galileo, Savonarola, Americus Vesputius—these and many others of outstanding fame worked or lived in Florence at various times. The city is called by its people *Firenze la Bella*, "Florence the Beautiful." It lies in the fertile valley of the River Arno, close to the picturesque Apennines, and is 140 miles northwest of Rome.

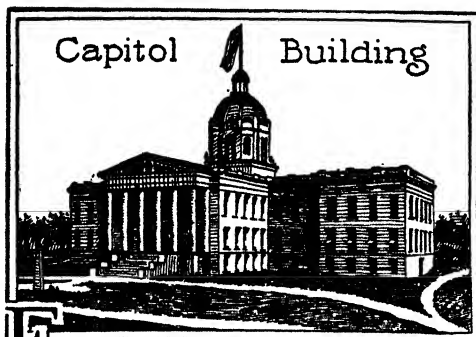
To the art lover, Florence is a place of marvels. It possesses two world-famous art palaces, the Uffizzi and the Pitti, in which are preserved many priceless works of the old masters (see PITTI PALACE; UFFIZI). These two buildings are connected by a passageway which runs through the upper part of the Ponte Vecchio (Old Bridge), one of six bridges which span the Arno. In the Piazza Duomo (Cathedral Square) there are three structures of special interest—the beautiful Cathedral of Saint Mary of the Flower, the dome of which gave Michelangelo his inspiration for that of Saint Peter's; the Campanile, or bell tower, built by Giotto; and the eight-sided Baptistery, with bronze doors designed by Ghiberti. Michelangelo's statues for the tombs of the Medici may be seen in the Church of San Lorenzo, and the

ancient monastery of San Marco, of which Savonarola was prior, has walls decorated with the well-known angel faces painted by Fra Angelico. Another famous church, Santa Croce, contains the tombs of Michelangelo, Galileo and Machiavelli, and the empty sepulcher of Dante.

Founded by Roman colonists over a century before the birth of Christ, Florence had become a thriving center of the goldsmith and jewelry trade by the early medieval period. Between 1282 and 1530 it was a city republic. In 1434 it fell under the sway of the Medici family, and under Lorenzo the Magnificent it became the chief center of the Renaissance movement. The plots of the Medici family caused the city to lose its liberties, and in 1530 it was captured by the army of Charles V. Two years later ducal government was set up, and in 1569 Florence was merged with the Grand Duchy of Tuscany (see TUSCANY). Between 1865 and 1871 the city was the capital of the kingdom of Italy, and it is the present seat of government of the province of Florence. Population, including numerous suburbs, 1931 census, 316,286.

FLORENTINE SCHOOL OF PAINTING, the name given to a period and a group of painters in Italy in the fourteenth and fifteenth centuries. During the latter century it was the most influential factor in art in all the world. Giotto was its early exponent; there followed him Fra Angelico, Filippo and Filippino Lippi, Botticelli, Ghirlandaio Da Vinci, Michelangelo, Andrea del Sarto and others. The work of the Florentine painters was not as rich in color as was that of the Venetian school, but it excelled in composition; figures were all exquisitely modeled.

FLORICULTURE, the cultivation of flowering plants for ornamental purposes. This branch of industry has developed steadily since the middle of the nineteenth century. There are now more than 7,400 establishments in the United States devoted to the raising of flowering plants, and there are hundreds of acres of land under glass (see GREENHOUSE). Florists do a thriving business in all large cities, especially where space for yards is limited. There is always a demand for choice flowers, and high prices are paid for rare species or plants made to bloom out of season. Some of the achievements of Luther Burbank in flower culture are told in these volumes in his biography.



FLORIDA, THE PENINSULA STATE, comprising the southeastern extremity of the American republic. The state is a peninsula 450 miles in length from north to south; the central part of the state is about 100 miles wide; the boundary line separating Florida from Georgia and Alabama on the north is 375 miles long.

The Atlantic Ocean lies on the east, the Straits of Florida are on the south and the Gulf of Mexico is west. The coast line of 1,200 miles exceeds that of any other state in the union. Extending southwestward from the southern tip of the mainland for 200 miles are the Florida Keys, a line of small, low islands, most of them of coral formation. On the farthestmost islet is the city of Key West.

The area of Florida is 58,666 square miles; the population in 1930 was 1,468,211. There were seven cities with populations exceeding 25,000: Jacksonville, 129,549; Miami, 110,637; Tampa, 101,161; Saint Petersburg, 40,425; Pensacola, 31,579; Orlando, 27,330; West Palm Beach, 26,610. Tallahassee, the capital, had a population of 10,700. Florida has a larger urban population than any other southern state. In winter months thousands of visitors increase the population and many of them have become permanent residents. This tourist invasion has greatly affected the development of the state; its only close rival as a winter resort is California. Jacksonville, Saint Augustine, Saint Petersburg, Miami, Key West, Palm Beach, Orlando and Tampa are the principal winter resorts.

Surface and Drainage. The northwestern part of the state is hilly and rolling, being an extension of the Alabama uplands. This region descends to a low flat coast. The eastern part of the state is low and nearly level, but the surface rises from each coast towards the interior, where in some places it reaches a slightly higher altitude. The highest point

in the state, near the extreme northwest corner, is 274 feet above the sea. The lands along the coast are low, level and often marshy. They have been formed by gradual elevation from the ocean and by the action of lime secreting organisms. This strange formation is still going on, as seen along the coast and in the growth of the Florida Keys, which appear to be an extension of the mainland. South of Lake Okeechobee the Big Cypress Swamp and the Everglades extend over a large part of the peninsula. These swamps are now being drained and transformed into fertile farms. The western coast contains several deep indentations in which good harbors are found, but the eastern shore is much more regular.

The principal rivers are the Saint Mary's, forming a part of the boundary between Florida and Georgia; the Saint John's, flowing into the Atlantic; the Caloosahatchee, draining Lake Okeechobee into the Gulf; the Peace, flowing into Charlotte Harbor; the Suwanee, famous in song, crossing the state from the north, and the Apalachicola, which is an extension of the Chattahoochee and Flint rivers of Georgia. The state contains over 35,000 lakes, the largest of which is Okeechobee, which has an area of 1,250 square miles. This is situated on the northern border of the Everglades.

Climate. Except in the swamp region the state possesses one of the most equable and healthful climates in the United States. It is free from extremes, the winter temperature seldom falling below 32° and the summer temperature rarely exceeding 90°. The average annual winter temperature is 71°, the average summer temperature, 85°. There is little spring or autumn and such a brief winter that summer is said to last two-thirds of the year. June, July and August constitute the rainy season. The rainfall is 55 inches at Jacksonville and over 60 inches in some places on the Gulf coast. There are on an average 250 clear days in the year. Severe droughts and frosts are rare.

Flora and Fauna. It would be difficult to find a region in the United States that presents a greater variety in animal and plant life. Tropical and subtropical climatic conditions have favored the development of a large number of species not found in more northerly districts.

Animal life includes the trunk turtle, sea cow, alligator, crocodile, otter, cow fish, sar-

gasso fish, southern puffer, barracuda, crown melongena, shark sucker, king fish, porcupine fish, green parrotfish, sail fish, Nassau grouper, sea trout, wahoo, ibis, mocking bird, yellowthroat, limkin, spoonbill, American egret, great blue heron, Florida jay, ruby-throat humming bird, and least tern.

The fruits of Florida are the tamar guava, avocado, mango, banana, Otaheite gooseberry, plum, orange, grapefruit, lychee, pineapple, carissa, kumquat, and the Surinam cherry, to mention only those best known. Flowers and trees include the coconut palm, and magnolia, lotus, poinsettia, orange blossom, night blooming cereus, air plant, hibiscus, live oak, lily, and the white prickly poppy.

Mineral Resources. The minerals are comparatively few. Phosphate from Polk County and other districts is exported to Europe for fertilizer. Lime, kaolin, limestone, brick and tile are important. Florida yields about three-fourths of the nation's output of fullers' earth. Mineral products are worth \$20,000,000 in some years.

Agriculture. Agriculture is the leading industry of Florida. Northern Florida produces cereals (except wheat), arrowroot, rice, potatoes, tobacco, figs, peaches, pears and sea-island and short-staple cotton. In Middle Florida the products are cotton, sugar cane, sweet potatoes, tobacco and many fruits. In the south the chief fruits are bananas, pineapples, olives, avocados and coconuts. Grapefruit, oranges and pineapples are exported in vast quantities; oranges often surpass all other products of the state in value; other farm products in the order of worth are grapefruit, corn, peanuts, potatoes and cotton.

The forests yield cypress, yellow pine and turpentine and resin. Pecans and vegetables have been exploited as a promising source of income. The tobacco of western Florida is valued for cigar manufacture.

Industry and Transportation. About 2,000 industrial plants are established in Florida. The products include cigars, lumber, railway cars, and timber products. Food fish and shellfish are abundant. Apalachicola has developed the oyster industry as have some other localities; sponge fisheries among the islands are extensive. Fisheries have yielded \$20,000,000 of products in a year.

There are many good harbors, especially on the gulf coast. A few of the rivers are navi-

gable for small boats. Jacksonville, Key West, Tampa and Miami lead in the import trade. The railways extend for about 6,000 miles over the state. The principal railways are the Seaboard Air Line, the Atlantic Coast Line, the Florida East Coast Line and the Louisville and Nashville. The city of Key West and the islands adjacent have connection with the main line of the Florida East Coast Railroad by a remarkable railway built on the islands and on causeways over the intervening waters.

Florida maintains 67 airports and landing fields. The All-American air races at Miami have an international reputation for large attendance. A sea-plane base costing a million dollars is maintained at Miami. More transoceanic air passengers arrive and depart at Florida ports than anywhere else in America.

The highways extend to about 9,200 miles; two-thirds of them are surfaced. Canals total 500 miles in length.

Government. The legislature consists of a senate and an assembly, the former composed of thirty-two members, chosen for four years, and the latter of eighty-four members, chosen for two years. The legislative sessions are held every other year and are limited to sixty days. The governor is elected for four years and is not eligible to succeed himself. The other state officers are the attorney-general, secretary of state, comptroller, commissioner of agriculture, treasurer and superintendent of public instruction. The courts consist of a supreme court, comprising a chief justice and five associates, chosen for six years; also circuit, criminal and county courts and those of justices of the peace.

Education. Among the most prominent of the higher institutions of learning are the University of Florida at Gainesville, the Florida State College for Women at Tallahassee, the John B. Stetson University at Deland, Rollins College at Winter Park, University of Miami at Miami and Southern College at Lakeland, all for white students. There are two schools for the higher education of Negroes.

History. Florida was discovered on Easter Sunday (Spanish, *Pascua Florida*, hence its name,) 1513, by Ponce de Leon, a Spanish adventurer in search of the fountain of perpetual youth. De Narvaez and De Soto both traversed the country. Huguenot refugees twice attempted settlement on

FLORIDA

EVERGLADE STATE



State Seal



On the
Upper Saint John's



Florida leads in these



Alligator



Orange Blossom,
State Flower



Old Spanish Gate,
St. Augustine

Items of Interest on Florida

The western coast line is less regular than the eastern, being indented by a number of bays and harbors, the largest of which are Charlotte Harbor, Tampa Bay and Pensacola Bay.

Nearly half of the varieties of forest trees in the United States are common in Florida.

Among the sports available in Florida are Jai Alai, golf, tennis, aquaplaning, surf bathing, inland water cruising, fishing and hunting.

The famous Ringling Art Museum at Sarasota is built around a large court of great beauty and contains the largest private collection of paintings by Rubens in the world.

The trunk turtle appears occasionally in Florida waters; it sometimes attains a weight of 1,000 pounds.

The southernmost point in the United States is Sand Key with a latitude of 24° 27' 12" north.

The banana which is widely cultivated in Florida is the most prolific food plant known.

Florida has belonged to the following nations: Spain, France, England, Spain again, and the United States.

The forests of Florida cover 27,000,000 acres.

The income of the state is derived from the following sources, listed in the order of importance: manufactures, tourists, fruit crops, lumber, field crops, truck crops, minerals, naval stores, fish and sea food, livestock, poultry and dairy products.

Questions on Florida

How does the coast line of Florida compare in length with that of other states?

Describe the surface of the state. Where is the dividing line for river drainage? Name the principal rivers.

What are the Everglades?

What are the attractions that draw so many visitors to Florida?

What has become of the Indians that formerly occupied this region?

What are the principal sources of wealth in the state?

the Saint John's River; the second time the colonists were massacred by Spaniards under Menendez, who founded Saint Augustine. In 1699 the Spaniards founded Pensacola. East and West Florida (separated by the Apalachicola River) came under the control of the English by the treaty of 1763; were ceded to Spain in 1783 and transferred to the United States in 1819, after a long controversy, due to the fact that Florida was a haven for pirates and thieves and a refuge for fleeing slaves, while Spain took no steps to preserve order.

On March 3, 1845, Florida was admitted to the Union as the twenty-seventh state.

A decision was made to remove the Seminole Indians to lands west of the Mississippi; the Indians repudiated the removal treaties and war followed from 1835 to 1842, when a part of the Indians were taken to the West. Following the Civil War the Fourteenth Amendment was ratified and a new constitution was adopted; in 1868 Florida was re-admitted to the Union.

For a long period the political contests for the control of the state were bitter; the financial troubles were distressing. In 1916 the state legislature proposed a grandfather clause as an amendment to the constitution, but the people defeated the measure. Widows who have dependent families are exempt from taxation if their property is not worth more than \$500. The constitution prohibits an income tax. Residence properties valued at \$5,000 or less are not subject to taxation. Commercial enterprises are not taxable during the first fifteen years of their existence.

The serious menace of the Mediterranean fruit fly in 1929 was checked by stern methods adopted by Federal and state authorities; the damage done however was enough to affect the banks of the state. The draining of the Everglades is a major state project assisted by Federal authorities and already producing a vast change in the economic conditions of southern Florida. The domain set apart for the Florida National park will be another beautiful recreation area.

Related Articles. Consult the following titles for additional information:

Apalachicola River	Mexico, Gulf of
Dry Tortugas	Palm Beach
Everglades	Pensacola
Electoral Commission	Saint Augustine
Florida Keys	Saint Petersburg
Grandfather's Clause	Tallahassee
Jacksonville	Tampa
Key West	Seminole

FLORIDA, UNIVERSITY OF, a state institution located at Gainesville. The Florida Agricultural College was founded in 1884; it was enlarged and became the state university in 1903. The organization comprises the following units: colleges of arts and sciences, agriculture, engineering, law, education, business administration; the graduate school; schools of pharmacy and of architecture and allied arts; the extension division; and the university libraries which contain over 100,000 volumes. The honor system has long been established; it is administered by officers chosen by the student body. The student organization administers also the extra-curricular affairs of the institution. The agricultural experiment station is supported by both Federal and state funds. It serves as the research division of the College of Agriculture. Student enrolment is about 4,000; the faculty numbers nearly 200.

FLO'RIIN, from the Latin *florem*, meaning *flower*, is the name given to a gold coin which originated in Florence, Italy, in the thirteenth century. It was so called because one of its faces bore a floral design. Similar coins have since been used throughout Europe. The English florin is equal to two shillings, or about fifty cents. Until recently the florin was the monetary unit of Austria; there it is now called a *guilder*, and is worth about forty cents. The Dutch florin has the same value. See COINS, FOREIGN.

FLOTOW, *fl'ot'o*, FRIEDRICH VON (1812-1883), a German composer of opera. After a brief musical education he began in 1830 to devote himself to composition. His *Le Naufrage de la Meduse* was successfully produced at the Renaissance Theater in 1839; this was soon followed by *L'Esclave de Camoens*, *Le Forestier* and *Alessandro Stradella*. His best opera, and the only one which is heard to-day, is *Martha*; this was first given a hearing at Vienna in 1847.

FLOUNDER, one of the most common of the flat sea fishes, found along the shores



FLOUNDER

of almost all countries. The body, which is extremely flattened at the sides, has the upper

side dark and spotted and the under side white. Both eyes are on the upper side, and one is set lower than the other, giving the face a twisted appearance. The flounder is esteemed for its flesh.

FLOUR, in the common acceptance of the term, a finely ground preparation made from the best part of wheat. It is the basis of most of the bread used in the United States and Canada, and in many countries in the Old World. When merely the term *flour* is used wheat flour is generally meant. That made from any other cereal usually receives a qualifying term, as rye flour, rice flour, barley flour, etc.

Wheat owes its popularity as a flour grain to the fact that it contains a tenacious form of gluten, a substance which makes the dough of the bread tough and sticky. As a result, the bubbles of gas which form through the action of yeast are retained by the dough, and it becomes light and porous. Wheat flour ranks high in respect to nutriment.

Early Methods of Milling Flour. Flour has been milled for thousands of years. In the beginning, it appears, the grains were broken by pounding. Later came the use of a hollowed stone into which fitted another stone. The grinding was done with a rolling motion. About the beginning of the Christian Era the Romans developed a device known as the quern, made up of two stones, the upper one being turned round and round. Grain was dropped into a hole in the upper stone and flour came out at the edges. The quern was quite commonly used in Britain up to the seventeenth century. Gradually the stones were flattened out, then later grooved, and such stones were the means of grinding until about 1870, when rolls came into use.

How Wheat Flour is Made. The manufacture of flour entails a series of operations. The kernels must first be cleaned of dirt, seeds, chaff, fuzz and hair, and this is done by passing them through several machines. After the cleansing process the wheat is passed through several sets of rollers, usually five in number, each passage being termed a *break*. From the first grinding come first-break flour, middlings, or bits of the inner part of the kernel and of the hard outer layers (bran), and unbroken wheat. The next series of rollers pass over the unbroken wheat left from the first break, and it, too, is separated into first-break flour, bran and

middlings. The middlings from each operation are purified and separated from by-products such as bran, and finally are reduced by a series of grindings to high-grade flour.

Lower grades and special trade brands are made by mixing in various ways impure middlings or other by-products with different grades of flour. Unsifted wheat meal ground from the whole kernel is the Graham flour used so widely in making muffins. By whole-wheat flour is meant the meal obtained by grinding all of the kernel except the coarser portions of the bran.

Related Articles. Consult the following titles for additional information:

Barley	Corn	Rye
Bran	Gluten	Starch
Bread	Rice	Wheat



FLOWERS. The poet says that flowers were put into the world—

To minister delight to man
To beautify the earth.

So the student thinks of them until he begins to study botany; he then learns that they are modified branches, or shoots, designed for the production of seeds.

How Flowers are Constructed. In a typical flower there are four circles, or parts. The first, or outermost, is the *calyx*, which is often leaflike and

in the form of a cup. It is divided into separate parts, known as *sepals*. The function of the calyx is the protection of the more delicate parts within. The next circle within is the *corolla*, whose parts are called *petals*. The corolla is usually bright-colored, and its design seems to be to attract insects or birds and, also, to protect still further the *stamens* and *pistils*, that form the third and fourth circles. Each of the stamens is composed of two parts, a stem, called the *filament*, and a sack at the top, called the *anther*. The innermost organs are called pistils and consist of, first, an enlarged chamber, called the *ovary*, containing *ovules*; a stem, called the *style*, and a tube, called the *stigma*. Within the stamens is ripened the *pollen*, which must be carried to the pistils, in order to fertilize the ovules, which thereafter become seeds.

How Flowers Vary. Few flowers are alto-

gether typical. Often, not all of the four circles are present. Either the calyx or the corolla or both may be lacking, or only stamens may be found in one flower, while the pistils are in another flower on the same plant. The flowers on one plant may all contain stamens only, while those of another plant contain pistils only. Then, the parts of each circle may be variously united in one solid ring or cup, or so grown together that it is impossible to distinguish one circle from the other. However numerous or remarkable these variations, it is almost always possible to distinguish some trace of the typical flower; that is, if there are five divisions in any one of the circles, traces will be found of a similar division in the other circles.

The typical flowers are comparatively uninteresting if one considers the wonderfully irregular blossoms of many plants. The meaning of these strange shapes has not yet been fully determined, but botanists who have made a painstaking study of the varied forms think that all have some definite reference to the way in which the pollen is carried from stamens to pistils. The one great fact in the life of the flower is that the pollen must be transported to the stamen, and it has been proved again and again that those plants grow strongest and best which are from seeds fertilized by pollen from a different flower on the same plant or from an entirely different plant. If one considers that the brilliancy of color, the varied and wonderful shapes, the honey-bearing sacks, the peculiar markings are all methods of attracting insects or birds, the astonishing irregularity becomes even more attractive than at first it seemed. In the accompanying plate are to be seen some of the most remarkable forms of flowers.

Artificial Flowers are imitations of flowers, which may be made of various materials. Such flowers were known centuries before the beginning of the Christian Era; flowers made of papyrus bark and silk were common in Greece, and in both Greece and Rome there were in use wreaths of flowers made of gold and silver. During the Middle Ages artificial flowers were made in great numbers, especially in Spain and Italy, and were used for religious purposes. Among modern cities Paris takes the lead in the making of artificial flowers. The most common materials used in this industry are silks, linen, cotton, gauze, satin, velvet, wax,



FLOWERS

1, Columbine
2, Violet
3, Gentian

4, Pine Cone and Tassel
5, Mistletoe
6, Poppy
7, Bluebonnet

8, Sunflower
9, Golden-Rod



FLOWERS

1, Orange Blossom
2, Magnolia
3, Mountain Laurel

4, Rhododendron
5, American Pasque Flower

6, Violet
7, Daisy
8, Carnation

paper and glass. The stems are made of wire, wrapped with tissue paper or silk or covered with green rubber tubing.

Artificial flowers are used in the United States and England chiefly as trimming for ladies' headwear, but in Europe they are still in use for garlands and in house decorations. Another important use to which they are put is to illustrate the flora of the world in botanical laboratories. Of course the manufacture of flowers which are to be used for this purpose is a much more delicate task than that of flowers which are used merely for ornament, and the maker must have considerable botanical knowledge. There is at Harvard University a collection of flowers made of glass, which illustrate the flora of the United States.

Language of Flowers. Long ago, in the Orient, the custom originated of expressing one's thoughts and feelings by means of flowers. To some extent the custom still survives, though in the practical New World it is of little interest. Strangely enough, the language is almost universal, varying in different countries only in regard to certain flowers which are locally significant. Still, as in the olden times, the lily denotes innocence; the forget-me-not, friendship; the red rose, I love you, and the white rose, I will wed you. Besides these, the following are flowers whose significance is well established:

Amaranth.....	Immortality
Anemone.....	Anticipation
Apple Blossom.....	Admiration
Aspen Leaf.....	Fear
Brier.....	Insult
Buttercup.....	Wealth
Camellia.....	Illness
Calla.....	Pride
Candytuft.....	Indifference
Cornflower.....	Heaven
Cowslip.....	Youthful beauty
Cypress.....	Death
Daffodil.....	Unrequited love
Daisy.....	Simplicity
Dandelion.....	Coquetry
Evergreen.....	Hope
Everlastings.....	Undying affection
Fern.....	Forsaken
Five-leafed Clover.....	Bad luck
Four-leafed Clover.....	Good luck
Foxglove.....	Insincerity
Goldenrod.....	Encouragement
Heather.....	Loneliness
Heliotrope.....	Devotion
Hepatica.....	Anger
Honeysuckle.....	Fidelity
Hyacinth.....	Sorrow
Ivy.....	Trustfulness
Laurel.....	Fame
Lilac.....	Fastidiousness

Lotus.....	Forgetfulness
Marigold.....	Contempt
Moss or a dry twig.....	Old age
Myrtle.....	Wedded bliss
Narcissus.....	Vanity
Oak Leaf.....	Power
Orange Blossom.....	Marriage
Oxalis.....	Pangs of regret
Palm Leaf.....	Conquest
Pansy.....	Loving thoughts
Poppy.....	A tryst at evening
Rosemary.....	Remembrance
Rue.....	Repentance
Scarlet Geranium.....	A kiss
Snowdrop.....	A friend in need
Sting Nettle.....	Rudeness
Tuberose.....	Bereavement
Tulip.....	Boldness
Violet.....	Modesty
Yellow Rose.....	Jealousy

National and State Flowers. In some countries a flower has been legally adopted as national emblem, but in a majority of cases, by its association with the poetry, religious ceremonies or popular sentiment of the people it has gradually become universally recognized as the nation's symbol. The following list shows the generally accepted national flowers:

Canada.....	Maple Leaf
China.....	Narcissus
Egypt.....	Lotus
England.....	Rose
France.....	Fleur-de-lis
Germany.....	Cornflower
Greece.....	Violet
India.....	Lotus
Ireland.....	Shamrock
Italy.....	White Lily
Japan.....	Chrysanthemum
Mexico.....	Nopal Cactus, or Prickly Pear
Persia.....	Rose
Scotland.....	Thistle
Spain.....	Pomegranate
Switzerland.....	Edelweiss
United States.....	Goldenrod
Wales.....	Leek

In the United States, in 1899, by a popular vote, the goldenrod was selected as the national flower. A number of states have adopted, usually by vote of the public school children, certain local flowers as their emblems. The following is a list of these states:

Alabama.....	Goldenrod
Alaska.....	Forget-Me-Not
Arizona.....	Saguaro (Giant Cactus)
Arkansas.....	Apple Blossom
California.....	Golden Poppy
Colorado.....	White and Blue Columbine
Connecticut.....	Mountain Laurel
Delaware.....	Peach Blossom
District of Columbia.....	Nasturtium
Florida.....	Orange Blossom

Wonder Questions on Flowering Plants

Why do plants bear flowers?

All of the earth's flowering plants, and they constitute by far the majority of plants, produce flowers for the purpose of reproducing other plants. According to the botanist, the purpose of flowers is to bear seeds, and of seeds to make new plants. When we remember, however, the happiness that flowers bring to human kind, and how much they contribute to the world's beauty, we are inclined to believe that they were created also to increase our joy in life.

Is there a special reason for the bright colors, peculiar forms and pronounced odor of flowers?

This question opens up one of the most interesting fields in flower study. We must bear in mind that flowering plants multiply through the transference of pollen from one flower to another, and that birds and insects play a very important part in this work. They visit the flowers for pollen and nectar, and as they fly from blossom to blossom they carry with them the fertilizing grains. It is interesting to know that conspicuous colors and odors serve as a lure for these industrious pollen carriers, and that many curious shapes and markings are for the same purpose. Some flowers, like the roses and buttercups, attract all sorts of insect visitors; others are so shaped that only certain kinds can reach their pollen or nectar. The honeysuckle and trumpet flower allure the humming birds, and the violets are visited by bees, but not by smaller insects. A careful study of flowering plants shows the wonderful way in which nature has adapted the flowers to the needs of insects and birds, so that they, in turn, may help the plants carry on their life processes.

Do plants have the power of movement?

Of course we would never expect to see the rosebush in our garden get up and walk away like the dog lying beside it, but many plants have power to move in other ways. That is, they can move such parts as the flowers and leaves. The blossoms of the morning glory, for instance, close after the sun gets bright in the sky, and do not open until the next morning. The stamens of the barberry flower spring up when touched, and the leaflets of the sensitive plant fold over each other when the plant is shaken. The compound leaves of many plants have the power of changing the position of their leaflets according to changes of light and tempera-

ture. For example, the leaflets will be edgewise toward the sun during the hottest hours of the day, and be expanded horizontally when the sun is low. Some leaves droop, or go to sleep at night, such as those of the wood sorrel and acacia. So we see that various parts of a plant may change position, even though the plant itself is stationary. The familiar statement that an animal differs from a plant in its power of movement should be amended. It is more correct to say that most animals are more active than most plants.

Do flowers eat?

The life of a flower depends upon the nourishment the whole plant receives. We know that plants receive food from the soil, absorbing it through their roots; yet there are some interesting plants that capture insects and other small animals and digest them. If you are familiar with the sundew you will remember that at the base of the flower stalk there is a circle of roundish leaves bearing bristles. Each of these bristles ends in a knob covered with a sticky liquid. When a small insect lights on one of these knobs and cannot get away, the bristles begin to close over it, and it is soon a prisoner. Then the leaf pours out a juice that digests the soft parts of the insect, and the plant reabsorbs the liquid. This is the way one plant helps feed its flower. Then there is the interesting pitcher plant, whose leaves resemble a hooded pitcher. Most of the time the leaves are partly full of water, in which insects crawl and drown. The leaves of the Venus's flytrap, another curious plant, are in truth a trap for unwary insects, for they end in a hinged portion that opens and closes quickly upon unlucky visitors. Plants of this character, which feed on animal food, are called carnivorous plants.

Do flowers have souls?

The lover of flowers likes to think so, and much of the poetry about flowers suggests that they have souls. Someone has said, "The odors of flowers are their souls." But though plants respond so wonderfully to the care lavished upon them, they never talk to us in the sense that animals do, and the idea that they have souls is purely one of sentiment. The absence in plants of the thing we call mind or soul is an important point of distinction between the plant and the animal world. The higher animals possess an intricate nervous system with a brain center, but the most elaborate of culti-

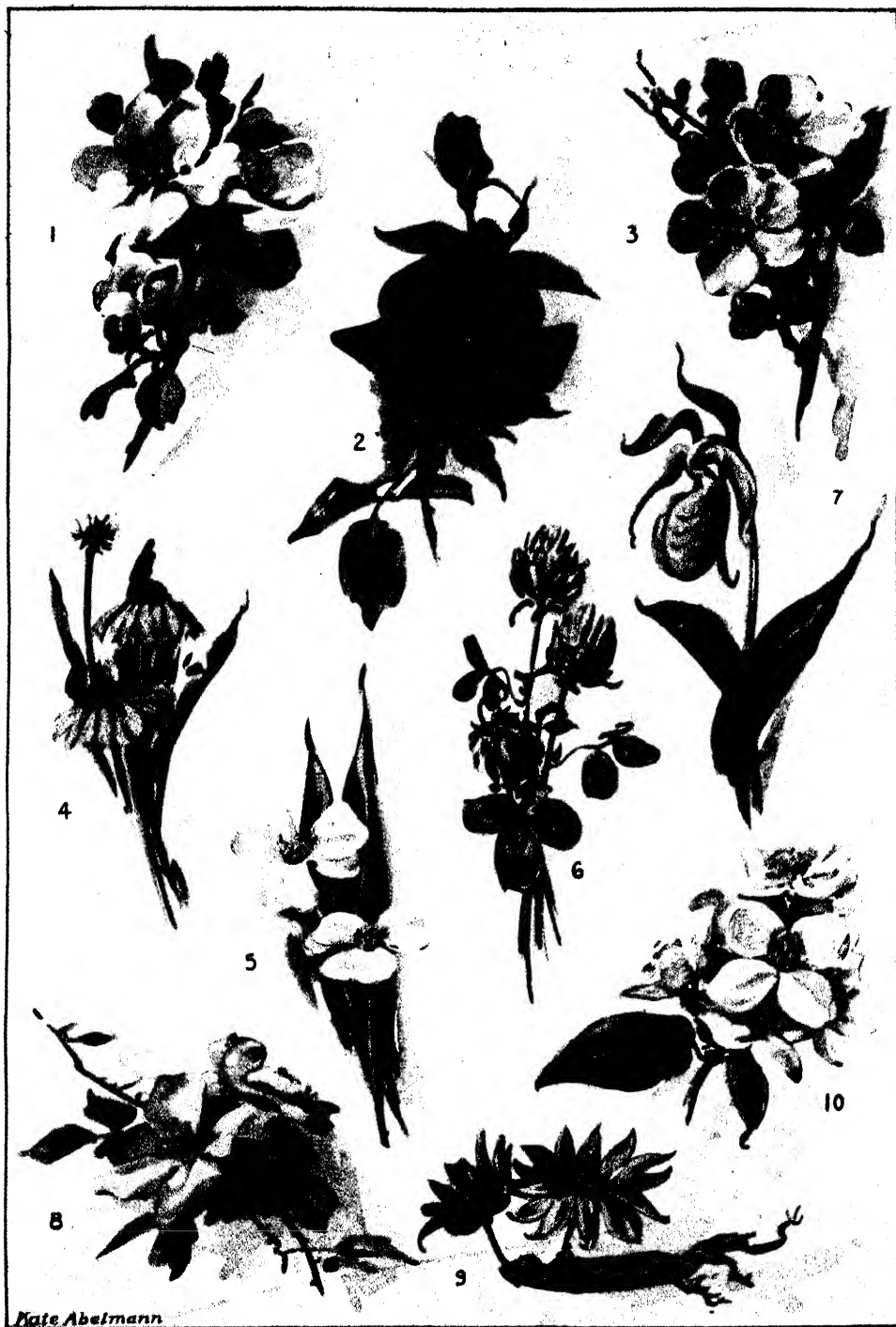


NATIONAL FLOWERS

1 and 2. Roses: England and Persia.
 3. Shamrock: Ireland.
 4 and 5. Lilies: Italy.
 6. Edelweiss: Switzerland.

7. Fleur-de-lis: France.
 8. Cactus: Mexico.
 9. Chrysanthemum: Japan.
 10. Thistle: Scotland.
 11. Sugar Maple: Canada.

12. Golden-Rod: United States.
 13. Lotus: Egypt and India.
 14. Pomegranate: Spain.
 15. Kaiser-Blume: Germany.



FLOWERS

1, Apple Blossom
2, Rose
3, Peach Blossom

4, Black-eyed Susan
5, Sego Lily
6, Red Clover

7, Moccasin Flower
8, Wild Rose
9, Bitter Root
10, Syringa

vated plants has nothing to correspond to a brain. Flowers therefore can be plucked without feeling pain, and they know nothing of fear, joy, sorrow or disappointment. It is the imaginative and sentimental in mankind that endows them with intelligence.

What gives the flowers their different colors?

Within the tiny seed, the nucleus of the plant, are produced certain ferments that determine the colors of the flowers. Just how this is accomplished no man can explain, any more than he can explain how the seed expands into a plant. We know, however, that leaves are green because they contain a green coloring matter called chlorophyll. The purpose of this substance is to help the plant manufacture starch. It is an interesting fact that no flowers are green. Some botanists explain this by saying that if the stem, leaves and flowers were all green insects would find it difficult to distinguish the flowers, which they visit to procure pollen and nectar.

Were the flowers all wild at one time?

Yes, all of our cultivated flowers are descendants of wild flowers. Many of the varieties that are now fairly common did not at one time exist, and the art of floriculture is constantly expanding. By scientific methods of breeding, men are able to produce new forms of nearly all flowers.

Do all trees bear flowers?

Yes, trees are important members of the great class of plants that produce flowers and seeds. Not all trees, however, bear flowers of size and prominence. In fact, the beauty of a great many trees depends chiefly upon their foliage, and most people never see their flowers. This is because the blooms of such trees have no petals, the most noticeable parts of the typical flower. But many fruit trees, such as the apple and cherry, have blossoms everywhere known for their loveliness and fragrance. This reminds us that flowers are produced in a wide variety of forms. A typical, or perfect, flower has four circles or sections—calyx, corolla, stamens and pistils—but very few flowers have all of these parts.

In what ways do flowering plants help mankind?

These plants help us in a great many ways. First of all, they make breathing easier for us. They use up a great deal of carbon dioxide, which we breathe out as waste matter, and they send into the

air oxygen, without which no one can live. Plants add to our comfort by providing shade in the summer, and they also prevent water which falls as rain or dew from too rapid evaporation. Forests help to regulate rainfall and to conserve moisture. From flowering plants we get the greater portion of the food that sustains life. Fruits, vegetables and cereals are all products of flowering plants. Our favorite beverages, tea, coffee, cocoa and chocolates, are derived from plants. All of the spices that we use to flavor our foods come from plant sources. Moreover, our clothing is partly of plant origin, for linen and cotton are fabrics woven of plant fibers. Then there are the trees, which provide mankind with wood for houses, ships and furniture. In fact, man could not exist without the wonderful plant kingdom.

Do all flowering plants of a certain kind belong to the same family?

There is always some definite connection between the plants of one family, but many curious relationships may occur. For example, the lovely Easter lily, the lily of the valley, the tulip, the hyacinth and the trillium belong to one family (the lily), but this same family contains also the ill-smelling onion and the unromantic asparagus. The rose family contains not only the loveliest flowers ever grown, but also the most delicious fruit plants—the apple, peach, pear, strawberry and others. But the cranberry and huckleberry belong to the heath family. Perhaps the strangest family is the nightshade, to which belong many useful plants, as the potato and tomato, and also many poisonous ones and a number of annoying weeds. Botanists group different plants together according to similarities of structure, not according to their degree of attractiveness.

Why is the dandelion considered a weed and the rose a welcome flower?

The term "weed" is applied to any flower when it multiplies so rapidly that it makes a nuisance of itself. Most people think a lawn is spoiled if the hardy dandelion gets hold in it, and that cheery little flower is anything but welcome. Dandelions need no encouragement. All they ask is to be let alone and they will grow abundantly. But the rose, the queen of the garden, needs the tenderest care and much coaxing. No one can imagine a mass of American Beauties, for instance, running riot over a lawn. A number of the attractive flowering plants that give color and charm to the country landscape are nothing but weeds to the farmer.

Georgia	Cherokee Rose
Idaho	Syringa
Illinois	Violet
Indiana	Zinnia
Iowa	Wild Rose
Kansas	Sunflower
Kentucky	Passion Flower
Louisiana	Magnolia
Maine	Pine Cone and Tassel
Maryland	Black-Eyed Susan
Massachusetts	Mayflower
Michigan	Apple Blossom
Minnesota	Moccasin
Mississippi	Magnolia
Missouri	Hawthorn
Montana	Bitterroot
Nebraska	Goldenrod
Nevada	Sagebrush Shrub
New Hampshire.....	Purple Lilac
New Jersey.....	Violet
New Mexico.....	Cactus
New York.....	Rose
North Carolina.....	Goldenrod
North Dakota.....	Wild Rose
Ohio	Scarlet Carnation
Oklahoma	Mistletoe
Oregon	Oregon Grape
Rhode Island.....	Violet
South Carolina	Yellow Jassamine
South Dakota.....	Pasque Flower
Tennessee	Iris
Texas	Blue-bonnet
Utah	Sego Lily
Vermont	Red Clover
Virginia	American Dogwood
Washington	Rhododendron
West Virginia	Rhododendron
Wisconsin	Violet
Wyoming	Indian Paint Brush

Related Articles. Consult the following titles for additional information:

Amaranth	Hollyhock
American Beauty	Honeysuckle
Arbutus	Hyacinth
Asphodel	Jack-in-the-Pulpit
Aster	Jonquill
Azalea	Lady's Slipper
Begonia	Lilac
Belladonna	Lily
Bignonia Lily	Lily of the Valley
Bitterroot	Lobelia
Black-eyed Susan	Lotus
Bleeding Heart	Marigold
Bluebell	May Apple
Buttercup	Mignonette
Calla	Moccasin Flower
Camellia	Moonflower
Campanula	Morning-glory
Candytuft	Narcissus
Cardinal Flower	Nasturtium
Carnation	Nelumbo
Christmas Rose	Oleander
Chrysanthemum	Orchid
Clematis	Passion Flower
Columbine	Peony
Cowslip	Petunia
Crocus	Phlox
Cyclamen	Pink
Dahlia	Poppy
Daisy	Primrose
Dandelion	Pyxie
Dog's-tooth Violet	Rhododendron
Easter Lily	Rose
Everlasting Flower	Snowdrop
Fleur-de-lis	Sunflower
Forget-me-not	Sweet Alyssum
Foxglove	Sweet Pea
Fuchsia	Sweet William
Gardenia	Tiger Lily
Gentian	Trillium

Geranium
Gladiolus
Gloxinia
Goldenrod
Harebell
Heliotrope
Hepatica
Hibiscus

Trumpet Flower
Tuberose
Tulip
Verbena
Violet
Wallflower
Water Lily
Wistaria
Zinnia

GENERAL TOPICS

Attar
Botany
Bud
Bulb
Catkin
Composite Family
Cross Fertilization
Exotic
Gardening
Greenhouse
Nature Study
Perfume
Plant
Pollen
Seeds

FLOYD, JOHN BUCHANAN (1807-1863), an American statesman and soldier, born at Blacksburg, Va., educated at the College of South Carolina. He was admitted to the bar and practiced his profession at Helena, Ark., but returned to Virginia in 1839. He later served in the legislature and was governor of the state. In 1857 he was appointed secretary of war and constantly administered favors to the party then demanding the secession of the Southern states, until December, 1860, when he retired from the cabinet at the request of the President. He was a brigadier-general in the Confederate army and was senior in command at Fort Donelson before its surrender. See FORT HENRY AND FORT DONELSON.

FLUID. A solid has rigidity, or elasticity of form; its form can be altered by applying pressure; but a fluid has no form unless it is supported by a containing vessel, or, to be more exact it conforms to the shape of any vessel in which it is placed. Fluids are divided into liquids and gases by means of two distinguishing properties:

First, a liquid, such as water, is but slightly compressible, while a gas offers relatively small resistance to a pressure seeking to reduce its volume. Water is reduced only .00005 of its volume by a pressure which will reduce air one-half of its volume.

Second, gases are distinguished from liquids by the fact that any mass of a gas in a closed vessel always completely fills it, whatever its volume. A liquid has bulk of its own, but a gas has not. The particles of a gas will always expand to the boundaries of its containing vessel.

Mechanics of Fluids. Perhaps you have never thought of fluids as exerting a pressure in all directions. Yet it is true. A board on top of water is evidence that there is pressure holding it up. We know water has weight and therefore exerts pressure down-

ward. It is a fact, too, that there is pressure on the sides. The pressure of a fluid is always at right angles to any surface on which it acts. Furthermore, if we neglect the weight of the fluid, pressure is the same at all points in the mass of the fluid. If, therefore, we apply pressure to any area of an enclosed fluid, the pressure acts equally in every direction.

The pressure of a liquid on a body immersed in it is a vertical force upward; this upward pressure is called "buoyancy." For example, suspend a weight by a string from the hook of an ordinary spring balance and note the reading. Now submerge the weight in water. The weight will be less. The law of buoyancy is said to have been discovered by Archimedes about 240 B. C.; a body immersed in a liquid is buoyed up by a force equal to the weight of the liquid displaced by it. When a body is immersed in a fluid, it may displace a weight of fluid *less* than, *equal* to, or *greater* than its own weight. In the first case, the upward pressure will be less than the weight of the body and the body will sink. In the second case, the upward pressure will just equal the weight of the body, which will remain in the fluid whenever placed. In the third case, the upward pressure will exceed the weight of the body, which will then rise to the surface. (For rules applying to specific gravity, see GRAVITY, SPECIFIC.)

Few of us think of the air as having weight. When the wind blows we know there is force in it, but who of us has thought that the air at rest has pressure? Years of experiment have finally proved that the pressure of the air is 1033.3 grammes per square centimeter, or 14.7 pounds per square inch, at sea level. One of the easiest methods of testing air pressure is by a barometer.

Related Articles. Consult the following titles for additional information:

Atmosphere	Barometer	Gas
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FLUORESCENCE, *flu o res'ence*, a property of certain substances by virtue of which they modify and change the appearance of light rays passing through them. The name comes from the mineral fluor spar (which see), some varieties of which exhibit this property in a marked degree. The phenomenon was discovered by Sir David Brewster in 1833. He noticed that when a ray of sunlight was permitted to pass through a lens and thence into a solution of chlorophyl (the

green coloring matter of plants), the path of the ray within the solution was marked by a red light. He tried the further experiment of admitting a beam of light from a lens to a solution of sulphate of quinine and found that the surface on which the beam fell became bright blue. From these and other experiments he discovered that the fluorescent substance absorbs a part of the light which falls upon it, and changes its wave length, thus altering the color. Among substances which are highly fluorescent are canary glass, paraffin oil and solutions made from the bark of the horse chestnut.

FLUORINE, *flu'or in*, the most active element known, belonging to the group known as halogens. It is a greenish-yellow gas, a little heavier than air, which attacks almost every substance with which it comes in contact. It is widely distributed. In combination with calcium it constitutes the mineral known as *fluor spar*; it also enters into the composition of the bones and teeth of animals. It combines readily with most other elements but not with oxygen, hence it will not burn in air. Isolated in a vessel it burns sulphur, carbon, phosphorus and hydrogen; also most metals, forming *fluorides*. Water at ordinary temperatures is decomposed by it, owing to the affinity of fluorine and hydrogen which together form hydrofluoric acid. Fluorine was first isolated in 1887.

FLUOR SPAR, fluoride of calcium. It is of frequent occurrence, in connection with beds of silver, tin, lead and cobalt ores. It is sometimes colorless and transparent, but more frequently it exhibits tints of yellow, green, blue and red. Fluor spar crystallizes in cubes. It is used as a flux in metallurgy and is a source of hydrofluoric acid, which is used for etching glass. Fluor spar is also known as *fluorite*. It is found in masses in scattered regions in Illinois, New York, Missouri and Colorado, in the United States; in the Lake Superior region of Canada, and in Norway, Switzerland and Saxony.

FLUTE, a wind instrument resembling a fife, but having more finger holes and from six to a dozen keys, thus giving it a compass of nearly three octaves. It is usually made of wood, and is about twenty-seven inches long. It is a very important instrument in an orchestra, and is often used for solo parts. A piccolo is a high, shrill flute; in the same class of instruments is also the flageolet.



FLY. While this name is applied to about 14,000 insect species, it is the domestic, or house, fly that is meant when the term is used without a qualifying word. The distinguishing characteristic of the flies is the possession of two wings, which gives them the name *Diptera*. Outside of this order there is only one insect, a small scale insect, which has two wings. Mosquitoes, fleas, midges, gnats and blow flies are all members of the order *Diptera*, but the house fly is the most commonly known of that order and the one described in the paragraphs below.

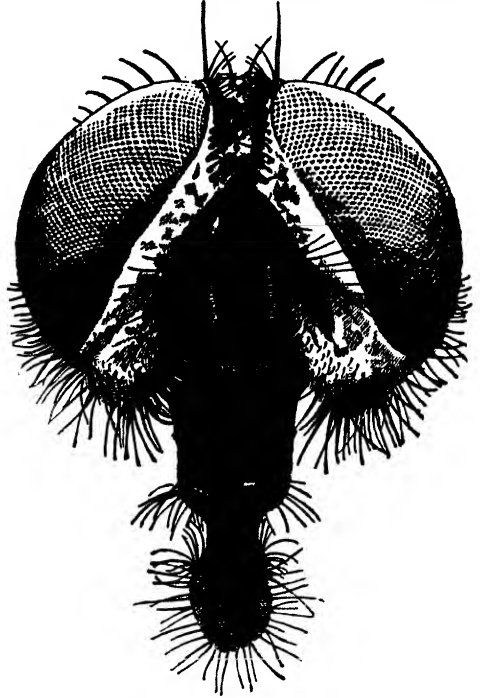
Nothing shows more clearly the advance made in knowledge of sanitation than the present-day attitude of the public toward this fly. A generation ago the expression "as harmless as a fly" was one of the commonest forms of comparison, now the insect is recognized as deadly to human beings. To-day there is scarcely a person who has not heard or read about the fly crusade, and the insect has no defenders in civilized countries. Physicians, social workers and school teachers everywhere are preaching against it and urging its extermination because it is a carrier of disease and a direct menace to health.

The two wings of the fly are marked lengthwise with veins, and are transparent. Nearly all of the head consists of two compound eyes, with which the fly can see in all directions. As shown in the accompanying illustration, these eyes are equipped with thousands of facets. Everyone has noticed the ease with which the insect walks on a ceiling, upside down, or climbs up a smooth, vertical surface, like a mirror. This it does with the aid of suckerlike hairs on its feet.

What is of greater importance is its ability to multiply. The female lays her eggs in rotting refuse or in the manure of a barnyard, and the larvae, which hatch in a few hours, are small white maggots, which change into pupae without casting their skins and in from eight to fourteen days become mature flies. As each fly lays more than one hundred eggs, and a new generation can be produced in ten days, it is evident that one fly

in a single season may have billions of descendants. A few flies survive the winter in sheltered places and so preserve the species, though it is probable that many of the pupae live through the winter.

Flies are a source of contagion, because they carry disease germs from their filthy breeding places and haunts to the food used by human beings. They infect butter, milk, meat and any other food which they light upon, and in this way they cause the spread of typhoid fever, infant disorders, tubercu-



HEAD OF HOUSE FLY

The two large areas studded with thousands of lenses are compound eyes. There are three simple eyes at the top center. The fly can therefore see in every direction. In the center opening are the feelers, or antennae.

losis and other infections. It is said that one fly can carry on its body over 6,000,000 germs. There are certain methods of prevention and extermination which all communities can adopt. Every stray winter or early spring fly should be killed relentlessly. It is the survivors which are permitted to lay the eggs that maintain the fly population. Breeding places, such as garbage, heaps of refuse and any other accumulations of filth should be destroyed or buried, and backyards should be kept in a strictly sanitary condition. Screened windows and

porches are helpful in keeping out the flies which persist in spite of precautions, and those which do slip into the house should be killed as soon as they are seen. Outside traps have been found useful. A simple one consists of a box of transparent material having in the bottom a crack not over a quarter of an inch wide. The crack should open up toward the bait, which may be any food flies like, such as sugar, molasses or banana peel. Many helpful suggestions on the war against the fly are to be found in pamphlets which the United States Department will furnish on request.

An outline for the study of the fly will be found in the article INSECTS.

FLY-CATCHER, a family of songless birds embracing about four hundred species. The birds were so named because of their means of livelihood. However, they do not confine their diet to flies. Perched on a favorable lookout the bird watches, immovable and alert, for any passing insect it may devour. When it sees its prey it darts at it, seizes it with a snap of its bill and returns to its perch. As the birds feed chiefly on insects, few of them are seen in cold climates, or in winter in temperate regions; the phoebe is one of these winter residents. Of birds belonging to the family there are about thirty species in the United States and Canada. The wood pewee, crested flycatcher, kingbird and Acadian flycatcher belong to this family, but the Old World flycatchers and the tyrant birds belong to another group. Many of the tropical species have brilliant plumage.

FLYING DUTCHMAN, in European legend, a phantom sea captain who sailed without rest upon the high seas. In life the captain swore during a violent storm that he would round the Cape of Good Hope if it took him until the Judgement Day. As punishment he was forced to sail the Southern seas forever. The legend has furnished the theme of an opera by Richard Wagner. According to his version the curse could be withdrawn if the captain could find someone who, knowing his fate, would consent to marry him. The story is one of the most tragic and beautiful in all opera.

FLYING FISH, a name common to various fishes which have the power of keeping themselves up for a time in the air by means of their large fins. It is not correct, however, to say that they fly. To escape from

the attacks of other fishes, especially the dolphin and the mackerel, they often pass through the air to a considerable distance, sometimes as far as two hundred yards. Among the best known species is that of the North Atlantic, also found near the Hawaiian Islands; also the *great flying fish*, measuring eighteen inches in length, found around California, and the *sharp-nosed flying fish*, found in Central American waters.



LYING, STORY OF. Since earliest time man has had the desire to fly. Primitive man watched birds dart and wheel through the air and no doubt flapped his arms in an attempt to follow them. The legends of many races show that this desire was universal. Magic carpets, flying coats, and birdlike wings figure in the mythology of the Anglo-Saxon, Latin, Asiatic, and even the In-

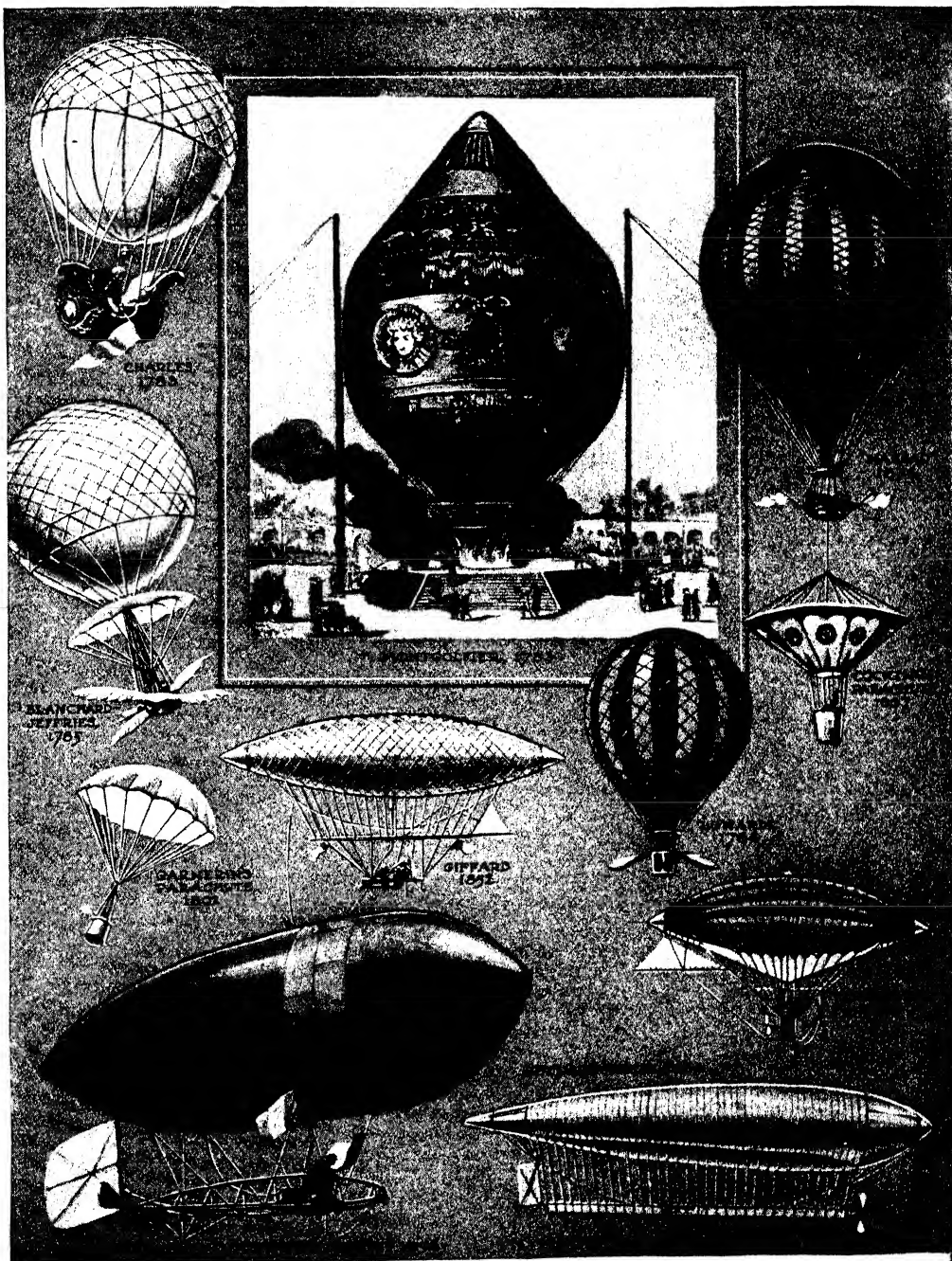
dian and Inca civilizations. Most of these traditions were, of course, mere flights of fancy, but others seem to refer to actual attempts to fly. The Greeks had the legend of Daedalus who was said to have flown by means of wax and feather wings, and of his son Icarus who was killed in following his father in the air. Tradition says that at the beginning of the Christian Era Simon the Magician mounted a fiery chariot and flew over Rome, and that the Saracen of Constantinople rose from a tower by means of a long robe stiffened with rods, only to fall and die.

First Serious Efforts to Fly. There is no way of telling whether these tales were founded on facts, but more recent history contains many references to serious efforts to fly. Most of these early experimenters tried to imitate the birds and fly by flapping artificial wings. Leonardo da Vinci is said to have made small models which lifted themselves from the ground in 1500. Da Vinci, a genius in science as well as in art, made a parachute that worked, and left many notes which showed a good understanding of the principles of flight. Many of the early experimenters hurt themselves in falling from buildings from which they had jumped with their wings fastened to their shoulders. One Italian, however, made a stiff wing of whale-

The Evolution of the Airplane

The following chronology lists only those experiments which have been outstanding contributions to the development of flying.

- 1500—Leonardo da Vinci, the great artist, scholar, engineer, experimented with aerial screws or helicopters; designed parachutes and gliders; and left notes and sketches for a man-propelled machine—no other power being known.
- 1678—Besnier, a French locksmith, was said to have made a successful glide from his garret window by means of paddles or vanes actuated by his arms and legs. (The engraving reproduced is obviously inaccurate, as the wing surface and construction shown would be inadequate for flight.)
- 1784—Launoy and Bienvenu built a model helicopter with aerial screws made of quills, rotated by a whalebone spring. They planned a similar man-carrying machine, but no adequate driving-force was available.
- 1809—Sir George Cayley, "Father of British Aeronautics," built a man-carrying glider which sailed 900 feet. He discarded flapping wings; experimented with helicopters; invented the rigid-wing biplane—made studies of curved wings; foresaw the need of the gas engine.
- 1843—Henson, with Stringfellow in England, experimented with steam-driven models—which just fell short of success. Henson designed and patented a steam monoplane and laid elaborate plans for a regular passenger service. Although no flight was made, the design had much in common with planes of today.
- 1848—Stringfellow produced a steam-driven model which actually flew.
- 1871—Penaud, in France, built a model propelled by a twisted rubber, which flew 131 feet. It had remarkable stability, based on mathematical data.
- 1872—De Villeneuve made hundreds of flapping wing models, some of which flew. He then built a full-size machine operated by a steam engine, and connected by a hose to a boiler on the ground. He arose but fear of breaking the hose cut short his flight.
- 1874—Moy worked along the lines set by Stringfellow; added new data on wing forms.
- 1891—Lilienthal, in Germany, experimented with gliders rather than mechanical models. He directed and controlled his machine by shifting his weight. With his pupils, Pilecher and Chanute, he contributed much to the ultimate solution.
- 1893—Sir Hiram Maxim built a 145-foot plane of 360 horsepower (steam). For scientific tests the plane was confined to a track, but the great lifting force tore up the rails.
- 1894—Langley, in America, built many steam models—one of which flew 4200 feet. He then built a man-carrying plane powered by a gasoline engine. In the attempt to launch it, in 1903, the machine was wrecked, but many believe Langley made the first practical airplane.
- 1896—Chanute, pioneer American glider, beginning at age of 64 made more than 2000 flights without accident. Instead of shifting his weight, as did Lilienthal, he controlled his gliders by manipulating the wings and rudder.
- 1903—The Wrights flew.
- 1908—Curtiss won the Scientific American trophy for the first public airplane flight in America for a distance of one mile.



PIONEERS OF THE AIR

Louis XVI witnessed the strange exploit of the Montgolfiers in 1783. Within the year other balloons were drifting through the sky—wherever the wind chose to carry them. The next century brought engines and rudders. Santos-Dumont made the first power-driven, controlled flight.



THE EVOLUTION OF THE FLYING MACHINE

Dreamers from the time of Nero have tried to build flying-machines. Real progress began with Da Vinci—followed by four centuries of experiment with gliders and power-driven models. Helicopters, flapping wings, rigid wings, springs, rubber bands, gunpowder, compressed-air, steam. From this groping fantastic quest emerged the Wrights—and the dream was realized.

The Evolution of Lighter-Than-Air Craft

1783 (June)—The Montgolfier brothers, of Annonay, France, after successful preliminary experiments, announced a public demonstration of their invention; and on June 5, 1783, the balloon was given to the world. The linen bag, 105 feet in circumference, rose to a great height, hung for ten minutes in the sky, and descended about a mile-and-a-half away. The lifting power was hot-air, from a fire kindled on the ground beneath the opening of the balloon.

In a second demonstration before the King and Queen at Versailles, a sheep, a cock and a duck had the distinction of being the first aeronauts.

(Aug.) J. A. C. Charles, meanwhile, had been experimenting with hydrogen balloons. In August he had sent up his first bag, of varnished silk. It shot up to a height of 3000 feet, traveled some 15 miles.

(Oct.) Two months later Pilatre de Rozier ascended in a captive balloon—which carried its fire along with it, making it possible to remain aloft much longer. To descend, the pilot simply threw a pail of water on the fire.

The king would not permit de Rozier to make a free ascent—without the restraining rope. He favored using two condemned criminals for the first hazardous trial; but de Rozier won out against such desecration and in November, with the Marquis d'Arlandes, made the first free flight in history (five miles).

In December, Charles and an assistant, Robert, made a flight of 27 miles in a hydrogen balloon. Aeronautics was now under way.

1784—Lunardi became the sensation of England; covering, in one of his flights, a distance of 110 miles.

He experimented unsuccessfully with large oars as a means of controlling his flight.

1785—Blanchard and Dr. Jeffries (American physician) crossed the English Channel in a balloon equipped with a parachute and wings.

1802—Garnerin made a parachute jump in England with a device very similar to those of today.

1836—Green, in England, ascended to 12,000 feet in the giant "Nassau" and traveled 500 miles in 18 hours—landing in Germany.

1852—Giffard in France, built the first power-driven airship: an elongated balloon 144 feet in length, with a screw propeller and 3 h.p. steam engine. The speed was about five miles per hour.

1883—Tissandier built an electrically driven ship which, despite the weight of batteries and motor, was able to make some headway and to be maneuvered to right or left.

1884—Reynard and Krebs carried on the electric-drive idea and produced a ship with a speed of 14½ miles per hour. A sliding weight was used for stability. This was the first airship capable of returning to its starting point.

1898—Santos-Dumont built his first airship, powered with a 3½ horsepower gasoline engine. This ship, which flew successfully, was followed by thirteen others of various shapes and sizes; each, as a rule, an improvement on the other. The inventor-pilot led a spectacular career. He seemed to regard his ships as pleasure craft with which to drop in unexpectedly at the races or here and there about town. He made accidental landings too—in trees, on rooftops, in the sea. He won the Deutsch prize of 100,000 francs, which he gave to charity.

bone and feathers with which he was able to glide for short distances. To some extent these early studies, based on imitating the shape of a bird's wing, helped the more successful men who followed, although no large practical ornithopter, a flapping wing machine, has ever been built.

As their knowledge of physical phenomena increased, other experimenters in the Middle Ages conceived the idea of the balloon. One monk proposed to exhaust the air from thin copper globes so that they would weigh less than the air they displaced, and would thus lift a basket which would be guided by oars and a sail. His theory of the balloon was sound, although of course there is no metal that is light and strong enough for such a purpose.

The First Balloon. The balloon, however, was the vehicle by which man first lifted himself into the air. The honor of building the first practical balloon fell to two French paper makers, Stephen and Joseph Montgolfier, who had amused themselves by filling paper bags with hot smoke over a fire and watching them rise to the ceiling. In 1783 they built a large balloon and filled it with hot air. It traveled several miles before coming down and was cut up by peasants who thought that it must be some monster from the skies. Next the Montgolfiers sent up a balloon that carried several barnyard animals, and when these had landed safely two men made a successful flight. The balloon was made more practical by the use of hydrogen gas, recently discovered, which did away with the necessity of suspending a fire basket below the balloon to maintain the supply of hot air.

The balloon had the disadvantage of being at the mercy of the winds. Sails, rudders, and large feather oars were tried for steering, without success. Devices like rudders had no effect because a balloon travels at the same speed as the air that moves it. Finally a steam engine attached to a propeller was suspended from a long, cylindrical balloon and the first "dirigible" was created. This balloon, which moved and steered under the control of the operator, was built by Henri Giffard in Paris in 1852. However, steam engines were too heavy and too dangerous to be practical. The real development of the powered airship was delayed until the creation of the light, powerful gasoline type of internal combustion engine. This type of

powerplant allowed Alberto Santos Dumont in France and Count Ferdinand von Zeppelin in Germany to build many cylindrical balloons which moved under their own power. At the beginning of the twentieth century these two men had brought the successful dirigible balloon or airship into being.

Beginnings of Mechanical Flying. In the meantime, many people were experimenting with mechanical flight. In England Stringfellow and Henson in 1842 devised a model flying machine, powered by a tiny steam engine, which flew successfully and which demonstrated the possibilities of heavier-than-air craft. Several obstacles, however, stood in the way of a practical airplane. The steam engine weighed too much per horse power to lift a large machine, very little was known about efficient wing design, and no means of controlling a flying machine had been devised.

During the next 50 years many gliders were built and flown. These were something like small crude airplanes without engines which coasted through the air from hill tops. Lilienthal in Germany, Pilcher in England, and Chanute in the United States all flew in gliders and contributed to the knowledge of aerodynamics. Usually the flyer balanced his glider by shifting his body.

Wright Brothers' Success. Attracted by the possibilities of flying, Wilbur and Orville Wright in the United States started to experiment with gliders in 1900. One of their first contributions to the art was to provide a rudder for the glider and arrange a means of twisting the wings so that they could control the direction of their glides while in the air. The Wrights experimented for two years and made more than 1000 flights. Finally they were ready to attach an engine and propeller to a large glider and learn if the combination would make possible practical flying in a powered machine. The gasoline engine had just been developed and the Wrights built one of their own, installed it in a lightly-built biplane, and on December 17, 1903, successfully flew the plane at Kitty Hawk, North Carolina. This flight marked the beginning of modern aviation.

One who narrowly missed the honor of achieving the first controlled power flight was Professor S. P. Langley in the United States. Langley began his work by building rubber-powered airplane models, then he built a small model powered with a light

steam engine which flew for three quarters of a mile. With this background Langley then built a full sized airplane, which, as was later proved, was quite capable of flight, but which was unfortunately wrecked in launching just nine days before the Wrights rose into the air. Like the Wrights, Langley had used a gasoline engine for power.

Since those pioneer days heavier-than-air machines have been remarkably improved until now they are an important and the most rapid means of transportation, as well as having attained a safety element that daily inspires growth in confidence. Within a brief period the consciousness of all enlightened peoples has accepted air flight as a commonplace, and busy people are increasingly grateful for facilities that annihilate time and space.

The world is circled by the airplane and the airship, for the Pacific Ocean, earth's last unconquered span, has been bridged by an air lane. More than ninety routes, about 200,000 miles in length, are marked for daily flight in the United States. Over the pampas of Argentina and high above the Andean peaks regular air schedules are maintained. Britain has its lines of communication with Australia and with South Africa. France keeps in close touch with its vast African possessions by routes over the inhospitable Sahara. Regular communication by airship links Germany and Brazil. Berlin has one of the greatest airports in the world.

Related Articles: Consult the following articles for additional information:

Airplane	Lindbergh, Charles A.
Balloon	Parachute
Diesel Engine	Santos-Dumont,
Dirigible Balloon	Alberto
Gas Engine	Transportation
Curtiss, Glenn	Wright, Orville and
Hammond	Wilbur
Langley, Samuel	Zeppelin, Ferdinand
Pierpont	

FLYING SQUIRREL, a curious little squirrel which does not really fly, but which can glide downward through the air with a movement similar to flight. It accomplishes this by means of an extension of its fur-covered skin on each side of its body, between its fore and hind legs. The little animal runs to the top of a tree, leaps out, spreading its legs and at the same time stretching out this side skin, which resists the air like a parachute. In this position the squirrel can glide sixty feet through the air, but only in a downward direction.

These animals are nocturnal in their habits, sleeping during the day and roaming the woods for food at night. They feed on nuts and leaf buds, and also on the eggs of birds and even the young, when obtainable. The common flying squirrel of the eastern part of the United States is about five inches long, exclusive of its bushy tail. It has bright black eyes and soft fur, which is grayish on the upper and white on the underneath side of the body. The *tagman*, the large flying squirrel of India, is sometimes called the *flying marmot* or *flying cat*.

FLY-WHEEL, a heavy wheel attached to the revolving shaft of a steam engine to secure uniform motion to machinery. When a body is once set in motion its motion continues until the starting force is exhausted. Thus a wheel set to rotating continues to rotate even after the force that started it is removed. The heavier the wheel the greater the force required to set it in motion and the longer it will rotate after the starting power ceases to act. Thus the flywheel accumulates force and equalizes power by resisting sudden accelerations of speed and preventing sudden retardations of motion.

FOCH, *fawsh*, FERDINAND (1851-1929), a great French military leader, under whose command the united allied armies brought about Germany's surrender in the World War. He was born in the Pyrenees Mountains. When a youth he became a lieutenant in the French army, and was one of the participants in the Franco-German War. When the World War broke out he was in command of a corps at Nancy, and in the first fighting showed such ability as a leader that General Joffre placed him in command of the Ninth Army at the Battle of the Marne, where he contributed materially to the victory that was won. Foch was then made chief assistant to Joffre in directing allied operations in the north of France, and in October, 1917, was appointed Chief of Staff. In that capacity he helped to steady the Italian front along the Piave River, and in February, 1918, he became chairman of the Executive Committee of the Supreme War Council.

In March came the great crisis of the war, with the German drive that threatened Paris and the Channel ports. In this supreme emergency the allies placed all of their forces under the command of Foch, as a result of which the armies acted in unison,

and the tide was turned. The masterly way in which he directed the allied forces in the counter-offensive proclaimed him one of the greatest strategists of history. General Foch was honored with the dignity of marshal.

FOG, or **MIST**, a cloud at or near the surface of the earth, produced by the condensation of the invisible vapor of the atmosphere into minute, watery particles. This condensation is caused by a cold current of air or the presence of a cold surface, as that of an iceberg. Fogs are more frequent in those seasons of the year when there is a considerable difference of temperature in the different parts of the day. The words *fog* and *mist* are frequently used without discrimination, and indeed there is only slight difference in their meaning. As ordinarily considered, mist is composed of particles of moisture (water) smaller than raindrops, in such compactness as largely to decrease visibility or even to destroy it. Fog contains water particles more minute than those of mist, and they may be so numerous as practically to blot near objects from view.

In a slight fog, the horizon is likely to be invisible, but objects not too far distant—up to perhaps a mile—may be seen in faint outline; ordinary traffic and pursuits are not measurably delayed. A slightly denser fog is termed one of the moderate variety, which reduces visibility to approximately half a mile, maybe somewhat less, rendering objects at such distance indistinct. Travelers on land proceed with caution; at sea, ships sound their fog signals. A thick fog renders visibility difficult for even a quarter-mile; sometimes objects cannot be seen farther distant than a few feet. Land transportation is extremely hazardous; navigation is at a standstill.

Fogs have interposed almost insuperable obstacles to air navigation; to fly into widespread fog has been in the past likely to end in disaster. The perfection of instruments to facilitate blind flying has removed much of the hazard, and aeronautical scientists are hopeful of developing devices by which fog banks can be pierced for short distances to provide visibility sufficient to carry aircraft to safety.

FOLKLORE, a nation's legends, traditions, songs and folk tales, beginning in the earliest history of the people and handed down by word of mouth from one generation to another. To folklore belong many

Mother Goose rhymes, the tales collected by the Grimm brothers, the story of Cinderella, numerous lullabies and fireside songs, and kindred forms of literature. The subject of folklore is one which engages the attention of the historian, the student of mythology, the sociologist, the religious scholar, and those who specialize in languages and race study.

FOMENTATION, in medicine, the application of warmth and moisture to a part of the body, for the purpose of driving tumors away or of easing pain by relaxing the skin. This is accomplished by applying cloths, especially flannels, wrung out of hot water or medicated fluids, such as opium, belladonna or turpentine.

FOND DU LAC', Wis., the county seat of Fond du Lac County, sixty-three miles northwest of Milwaukee, on Lake Winnebago and on the Chicago & North Western, the Minneapolis, Saint Paul & Sault Ste. Marie and the Chicago, Milwaukee, Saint Paul & Pacific railroads. By way of the Fox River there is connection with the Great Lakes. Important manufactures include lumber, flour, machinery, refrigerators, and agricultural implements. The city has a picturesque location, contains a Carnegie Library, an armory, an Elks' Club, a Masonic Temple and Saint Agnes Hospital and Sanatorium, and it is the seat of Winnebago Lutheran Academy. The state supports here a women's reformatory. The place was settled in 1836, and was chartered as a city in 1852. Population, 1930, 26,449.

FONTAINEBLEAU, *Fohn taN blo'*, a town of France, in the Department of Seine-et-Marne, in the midst of a forest of the same name, about thirty-five miles southeast of Paris. The town is famous for its palace and its forests. The castle, or palace, of Fontainebleau is one of the most magnificent in France. It occupies the site of a fortified chateau, founded by Louis VII in 1162; this was converted into a magnificent palace by Francis I and was much enlarged by succeeding monarchs until its completion in the eighteenth century. The park is laid out like a vast garden and is adorned with statues, temples, fountains, lakes and waterfalls.

FOO-CHOW. See FU CHOW.

FOOD, any solid or liquid substance which serves to nourish the body, maintain its temperature, and furnish the material necessary for energy and growth.

Food is not only necessary to existence, but it has a vital relation to health. Some foods build tissue, some produce fat, and all yield energy in a greater or less degree. To maintain health and a strong body a person should select his foods wisely, choosing a diet that will best meet his particular needs. It is necessary, then, to know something of the composition of the substances included in the diet, and understand the effects of different foods.

How Foods are Classified. According to their composition, or *make up*, foods are divided into the following classes:

Proteins. These are the only organic food compounds which contain nitrogen. In addition, they are made up of carbon, hydrogen and oxygen, and sometimes sulphur and phosphorus are found in them. They include cheese, lean meat, white of eggs, milk, peas, beans and nuts. The function of proteins is to build muscular tissues, and to replenish wasted energy. While proteins are of great importance in maintaining bodily vigor, they must not be eaten to excess. Undigested protein foods cause the formation of putrefactive bacteria, and these are a menace to health. The tendency of modern authorities is to advise great moderation in the eating of meat. Some claim that excessive meat eating causes cancer and other diseases.

Carbohydrates, the second group of foods, contain carbon, hydrogen and oxygen, the latter two being found in the same proportions as they occur in water. Starch and sugar are the most important carbohydrates. Starch is found abundantly in wheat, oats, corn, rice and other cereals, and in potatoes; molasses, honey and fruits contain a high percentage of special sugars. Foods containing a high percentage of starch or sugar are good fat builders; they also serve as fuel to yield energy.

Fats, represented by butter, lard, fat meat, olive oil, etc., are a third class of foods. They contain hydrogen and carbon and a small proportion of oxygen. Their chief function is to furnish fuel. As fats are digested less easily than carbohydrates, they must be eaten with moderation.

Heat Units. The energy produced by foods is measured in heat units called *calories*. This is the amount of heat required to raise the temperature of one pound of water four degrees Fahrenheit. According to careful estimates the number of

calories in a balanced diet should provide from twelve to sixteen per cent protein, thirteen to seventeen per cent fat, and sixty to seventy per cent carbohydrates.

Foods and Digestion. The wholesome or unwholesome character of any food depends, in a great measure, on the state of the digestive organs and also on the method by which it is cooked, a simple food often being made indigestible by poor cookery. The digestive power of the individual is always to be considered in determining whether a particular food is wholesome or not. In general, therefore, we can only say that that food is desirable which is easily soluble and is suited to the individual's power to digest it. Man is fitted to derive nourishment from both animal and vegetable food, but can live exclusively on either. The people of hot countries live largely on vegetable foods, while the inhabitants of the most northern regions live almost entirely upon fat, on account of its heat-giving property.

Care of Food. Food should always be kept clean and should be handled with particular care to prevent the collection of impurities. This means not only to protect it from visible dirt, but to be sure it contains no germ that will give disease to the person who eats it. Fruit and vegetables kept in dirty streets and peddled from dirty carts may carry the germs of consumption; water and milk may contain typhoid germs, and meats may have parasites that cause much trouble. They can be killed by thorough cooking.

Related Articles. Consult the following titles for additional information:

Adulteration	Digestion
Bread	Domestic Science
Butter	Egg
Calorie	Fletcherizing
Canning	Flour
Carbohydrate	Meat
Cheese	Meat Packing
Chocolate	Proteins
Cocoa	Pure Food Laws
Coffee	Starch
Cookery	Sugar
Diet	Tea

See, also, articles on the various grains, vegetables, fruits, nuts, meats and fish.

FOOD PRODUCTS, PRESERVATION OF.
See CANNING.

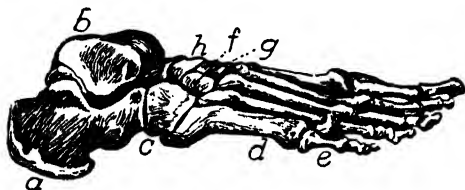
FOOLS, FEAST OF, the name given to festivals regularly celebrated by the clergy and laity, from the fifth century, to the sixteenth in several countries of Europe. The feast of fools was an imitation of the Roman Saturnalia, and, like this, it was celebrated in December. The young people, who played

the chief parts, chose from among their own number a mock pope, archbishop, bishop or abbot and consecrated him with many ridiculous ceremonies, in the chief church of the place, giving such names as Archbishop of Dolts, Abbot of Unreason, Boy Bishop, Pope of Fools. They often travestied the performance of the highest church officers. Masked and disguised, they danced and sang questionable songs and engaged in every conceivable folly which could be practiced by the Church. Except from their association with the Saturnalia, nothing is known of the origin of these extravagances, which appear to have been very ancient. They were most common in France, but the feast was also observed in Spain, Germany, England and Scotland. In France it survived till the year 1644.

FOOT, a measure of length, originating in the length of the human foot in ancient countries. The Greek foot was established as 12.1 inches in length; the Macedonian, 14.08 inches; the Pythian, 9.72 inches. The length of the English foot was determined by Henry I. He declared that the yard should be the length of his arm, and that the foot should be one-third of that length. His arm was thirty-six inches long.

The foot is the unit of line, or linear measure; the square foot, of square measure; the cubic foot, of cubic measure. The square foot contains 144 (or 12×12) square inches; the cubic foot 1,728 (or $12 \times 12 \times 12$) cubic inches. See **MENSURATION**.

FOOT, THE, in man and other vertebrate animals, the lower extremity of the leg, upon which the body rests in standing or walking. In man it extends from the ankle joint to the end of the toes. It includes the *tarsus*, or ankle, made up of seven bones, the *metatarsus*, or instep, made up of five bones, and the *phalanges*, or toes, each of which has three bones, except the great toe, which has but two.



THE FOOT

a, calcaneum; b, astragalus; c, cuboid; d, metatarsal, of which there are five; e, phalanges, of which there are five; f, external cuneiform; g, middle cuneiform; h, scaphoid.

FOOT AND MOUTH DISEASE, a severe infectious disease, which for more than a hundred years has frequently broken out among cattle, pigs and other even-toed domestic animals in Europe and frequently has spread to Asia and Africa. Both mild and severe forms of the disease are known. In the former there is some fever and weakness, during which eruptions appear, especially in the mouth and between the hoofs. Not a large per cent of these cases are fatal, but in the graver form as high as twenty per cent of the animals affected may die. It is particularly fatal among young lambs, and in sheep the eruptions are more persistent and serious, especially on the feet.

The microbe which produces the disease has not been recognized, but it is known that infection may be carried by water and that the bacteria thrive in dark and damp places. Inoculation with serum has not been successful in either preventing or curing the disease. Whenever the disease has been present in a stable, the building should be disinfected and its use should be abandoned for a period. Milk from diseased animals conveys the contagion to man.



FOOTBALL, a very popular sport in the autumn months, second only to baseball among the world's athletic contests. For the most part football is played by amateurs—college students and high-school boys, but there are also many teams of professional players. It is a game of skill and strategy as well as of physical stamina. The players are drilled by expert coaches, and the contests are often held in large stadiums, to accommodate the vast numbers

of people who enjoy the game.

Standard American football is based on the Rugby type of England. *Association football* is the second type of the game, which is very popular in England.

American Rugby. This game is played by two teams of eleven men each, on a field 360 feet long and 160 feet wide. The playing field is 300 feet, or 100 yards long. This field is divided by a cross line in the center;

and parallel to that line cross lines are drawn every 5 yards to the goal lines. In the middle of each end are two long, upright posts, more than 20 feet in height and 18 feet 6 inches apart. A horizontal crossbar 10 feet from the ground connects them. The object of the game is to carry the ball across the goal line of the opposing team or to kick it over the crossbar of the goal posts. When the ball is carried over the goal line, a *touchdown* is scored, and it counts six points for the team that carries the ball. After a touchdown, the successful team is allowed to put the ball in play in scrimmage formation, on the five-yard line. Only one play is permitted. A goal kick, another touchdown either by carrying the ball or by forward pass, counts one point. Under certain conditions the ball may be kicked over the crossbar from the field during the progress of the play, and by this three points are scored for the side

At the beginning of a game the ball is placed on the ground in the middle of the 40-yard line of the attacking team. The attacking eleven ranges itself in a line across the field, while the defending side distributes its men over its own side of the field, in positions which are most advantageous to catch and return the kicked ball.

At a given signal the ball is kicked and the line of players rushes forward. One of the opposing players catches the ball and runs with it toward the goal of the kickers off, as far as he may before he is "tackled" and thrown by one of his opponents. He need not have run with the ball, but might have kicked it back to his opponents, but as this would give them possession of the ball, it is a play not often resorted to. When the player with the ball is downed, an official blows a whistle, and the two teams line up with their backs toward their own goals in the

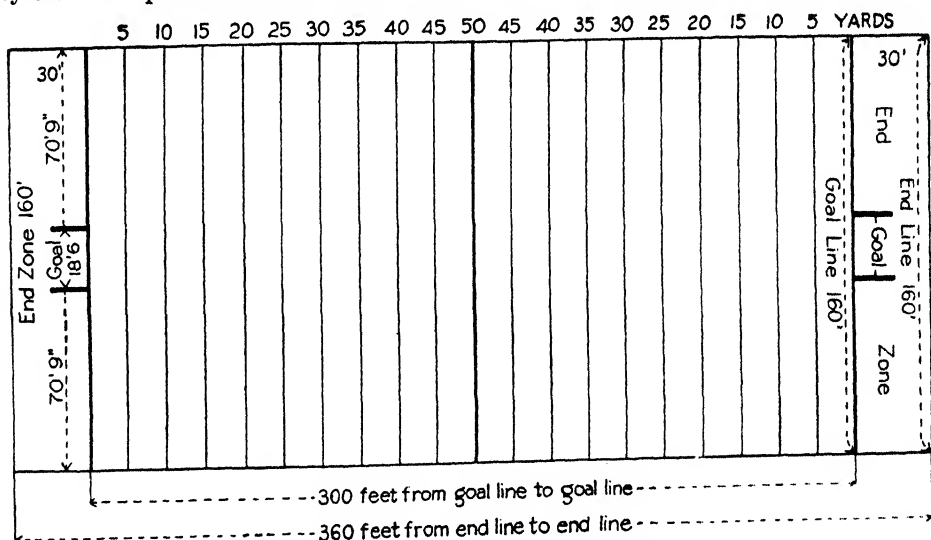


DIAGRAM OF A FOOTBALL FIELD

making the kick. If a person holding the ball is forced across his own goal line, it is called a *safety* and scores two points for the opposing team.

A game consists of four quarters of fifteen minutes each, with an intermission of fifteen minutes between the second and third periods, and one minute between the first and second and between the third and fourth. After the first and the third quarters, the teams change goals; at the beginning of the third period the teams take opposite goals from those assumed at the beginning of the game.

positions indicated in the following diagram, in which the squares represent the defending team, and the circles the attacking team. The men on a team are the *center* (C), two *guards* (G), two *tackles* (T), two *ends* (E), a *quarterback* (Q), two *halfbacks* (H) and a *fullback* (F). The men in pairs are distinguished by the word *right* or *left*, according as they stand to the right or the left of the center of their own team. Thus, the right guard stands at the right hand of his center. The names of the positions the men occupy are indicated on the diagram (Fig. 1)

and, with slight modifications, are the positions they occupy whenever the teams are thus lined up for a scrimmage. The central men of the attacking team stand close to-

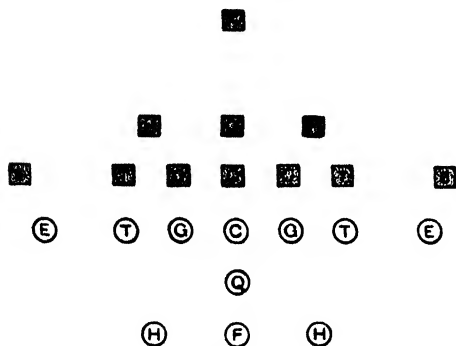


FIG. 1

gether in a stooping posture, the center with his hands on the ball, which lies on the ground between his feet and in front of them.

One of the players, usually the quarterback, calls the signals, which indicate what particular play is to be used. Then, after the quarter has signaled to the center that he is ready to receive the ball, the latter passes it quickly between his legs to the quarterback, who seizes it and gives it to one of the men behind him, who takes the ball and attempts, with the aid of his companions, to run through or around the line of the defending team and toward their goal, until he is tackled and thrown. Here the teams form again for another scrimmage, when a new play is executed in a similar way. If within a specified number of trials a certain distance is not made, the attacking team must give up the ball to their opponents who then become the attacking team and try to carry the ball toward the opposite goal.

It is permissible for the attacking team to kick the ball instead of to carry it, if they prefer, and this is usually done, at least on the last trial, when, if they fail to make the required distance, the team would be obliged to give up its ball. Whenever a team comes within striking distance of its opponents' goal, it may form in a different manner and attempt either a *drop* or a *place kick*, and if either is successful a score is made as indicated above. If the kicker fails to make goal, the ball is brought out to the 20-yard line and there the two teams line up in scrimmage formation with the ball in possession of the defending team.

Qualities of Players. Football calls for great strength on the part of some of the players; for speed and agility from others, and for quickness of thought and loyalty to team-mates from all. No team can succeed that does not play as a unit. Each man must not only know the duties of his own position accurately, but he must know how to play it to the best advantage of the rest of the team and must know when and how to assist each of the others. When the signals are given and any specific play is called for, every man on the team knows exactly what he is expected to do, and the play is successful only when each man does as nearly as possible that which he is expected to do.

Standard Plays. The many competent coaches have succeeded in devising a great number of effective plays, which may be grouped in two classes, those special plays which are good only occasionally, or are in the nature of surprises, and the standard or regular plays, which are repeated again with only such slight modifications as are necessary to deceive the opposing team. Of the standard plays, two types are most common. In one of these the players try to carry the ball directly through the line of the opponents, and in the other they carry it around the end of the opponent's line. It is evident that both of these types are susceptible of a great number of variations, dependent upon the person who carries the ball and upon the particular point to which he directs his attack.

Figure 2 shows what is done by the attacking team when the fullback tries to go between his center and right guard, and, with the assistance of the men behind him, carry the ball through the line of his opponents. The short double lines show where the ball is tossed; the black circle and the heavy black line indicate the man with the ball, and his course; the solid lines show the paths of the men who precede the ball, and the dotted lines show the courses of the men who follow behind the ball and push. In Figure 3 the course of the players trying to take the ball around the right end is shown. The lines have the same meaning as in Figure 2. It should be noticed in this that the quarterback and the right halfback go between the men carrying the ball and the opposing team, to form what is called the *interference*.

Several officials are required to interpret and enforce the rules in each game—the

referee, whose specific business it is to watch the ball; the *umpires*, who watch the conduct of the players; the *linesmen* who determine

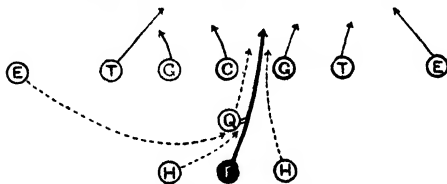


FIG. 2

how far the ball has been advanced, count the time taken out and are also responsible for detecting certain classes of fouls, especially offside play and roughness. The football quarter consists of 15 minutes of actual

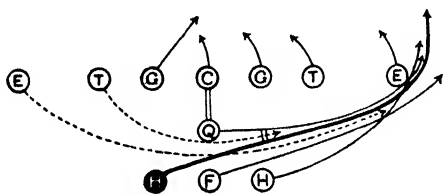


FIG. 3

play, and whenever the game is stopped for any reason, time is "taken out." The rules of the game are so numerous and complicated, and they change so from year to year, that the only way of being certain of them is to study the current manual.

Canadian Rugby. The game in Canada does not permit of *interference*; that is, a player is not allowed to precede a runner to protect him from opposing tackles. The rules differ from the American, further, in that off-side players must not approach within three yards of an opponent who is attempting a free catch of the ball, even if it has bounded on the ground. There are twelve men in the team. The game is scored as follows: for a *try and goal*, six points; for a *try*, five; for a *drop-kick*, three; for a *drop-kick or place-kick* after a penalty, two; for a *safety-touch*, two; for a *rouge*, one.

These names are explained as follows: A *try* corresponds to a touchdown in American football. If a team is downed with the ball behind its own goal line, a *safety-touch* is counted against it if it has carried the ball there itself, a *rouge* if the other side has sent or carried it over the line. A *rouge* is also scored when a team secures the ball

more than twenty-five yards behind its opponent's goal, or both behind the goal and outside of the touchline (side line).

English Rugby. This type of game differs in only a few details from the Canadian game. The English retain what is known as the *scrummage* and the *throw-in*, both of which have been discarded in Canada and the United States. The throw-in is employed when the ball goes out of bounds at the side of the field. The ball is thrown upon the field between the two teams, each lined up parallel to the 5-yard lines. In the scrummage the forwards (eight members of each team) gather around the ball and push each other with their heads, each side trying to heel the ball into such a position that its backs may get it and carry it away. Fifteen men constitute an English team.

Association, or "Soccer," Football. This is a type of game originated by the London Football Association in 1863, hence its name. The word *soccer* is an English slang term derived from *association*. The game continues ninety minutes, with only one minute intermission in the middle of the game. It is more lively, or more continuous, than Rugby football.

The ball is kept on the move up and down the field, pausing only as opposing players strive for its possession. It is bunted from the heads of players, kicked along for short distances, either forward or sidewise to another player, and by such tactics brought nearer to a net stretched between the goal posts, into which it is kicked. It is seized then by the goal keeper and kicked into mid-field, where the struggle begins again.

Spaldings Football Guide, issued annually, is recommended for rules of the game. Consult, also, Yost's Football for Player and Spectator.

FOOTE, ANDREW HULL (1806-1863), an American naval officer, was born in New Haven, Conn. He was graduated from West Point and entered the navy in 1822. He was promoted rapidly, receiving successively command of the Boston and Brooklyn navy yards and later command of the brig *Perry*, with which he cruised the African coast in the interest of American commerce and to put a stop to the traffic in slaves. In 1852 he was promoted to the rank of commodore. In 1861 he directed the attacks on Forts Henry and Donelson and the following year was transferred from the western flotilla and put in charge of the bureau of equipment and

recruiting. In June, 1863, he was appointed successor to Rear-Admiral Dupont, in command of the fleet off Charleston, but he died before assuming the duties of this position.

FOOTE, ARTHUR (1853-), an American concert pianist, organist and composer. He was born at Salem, Mass., and was educated at Harvard University. His training in music was thorough, and his compositions won for him an honorable place among American composers. The first of his compositions to attract serious attention was *Trio in C Major*, for piano and stringed instruments. This was followed by compositions in a variety of forms. His larger works for orchestra include a *Symphonic Prologue*, *Suite in E Major* and *Francesca da Rimini*. Popular among his concert pieces are his musical settings of Longfellow's *Wreck of the Hesperus* and *Hiawatha*. His songs, of which there are nearly a hundred, have endeared him to a wide public. The best known of these are *I'm Wearin' Awa'*, *I Arise from Dreams of Thee*, *In Picardie* and *My Love's Like a Red, Red Rose*.

FOOTE, MARY HALLOCK (1847-), an American author and artist, born in Milton, N. Y. She married a mining engineer and lived after her marriage in Colorado, Idaho and California. Much of the material for her novels she drew from her experiences there. *The Desert and the Sown*, *The Prodigal*, *Coeur d'Alene* and *The Led Horse Claim* are some of her works. She also produced many pen and ink sketches for magazine and book illustrations.

FOOT POUND, in physics, the term expressing the unit of work done by a mechanical force, in the foot-pound system. A foot pound is the amount of work required to raise one pound one foot vertically against the force of gravity at sea level in latitude 45°.

FOOT ROT, a disease in the feet of sheep, the more common form of which is an extensive growth of hoof, which at the toe, or round the margin, becomes turned down and cracked or torn, thus affording lodgment for sand and dirt. In the second form of the disease the foot becomes hot, tender and swollen. Ulcerations form between the toes and are followed by the formation of proud flesh.

FORAMINIFERA, tiny shell-covered animals, which, with few exceptions, live in the ocean, from the surface to great depths, some-

times attached to other bodies. When free they move themselves about by means of a whiplike projection. With few exceptions they are microscopic in size. Examined closely, their shells display a variety of forms, some of them of great beauty. One species is star-shaped, another is oval, others are spherical or spindle-shaped. All are covered with minute perforations which give them the appearance of being delicately carved. The animal deposits of chalk, found both in Europe and America, are composed principally of the fossil shells of foraminifera.

FORBES-ROBERTSON, SIR JOHNSTON (1853-), one of the foremost English actors of his day. He was born in London and educated at Charterhouse and the Royal Academy of Arts. Abandoning his idea of becoming a painter, at the age of twenty-one he went on the stage, and gained steadily in art and in popularity, both in England and in America. At various times he played with Mary Anderson, Sir Henry Irving and Mrs. Patrick Campbell. The plays in which he was especially successful include *Hamlet*, *Pelleas and Melisande*, Shaw's *Caesar and Cleopatra*, *The Passing of the Third Floor Back* and *The Light that Failed*. He married Gertrude Elliot, sister of Maxine Elliot. In 1913 he was knighted.

FORCE, *fors*, in physics, that agency by which the motion of a body is increased, diminished or changed in direction. In mechanics force is measured by the velocity it produces in a given mass in a definite length of time. The illustration of the effect of a constant force upon a moving body is shown in the law of falling bodies (see FALLING BODIES). There are two systems for measuring force, the English system, which uses the poundal as the standard of measure, and the Metric system, which uses the dyne (see DYNE).

A central, or *centripetal*, force is one that draws toward a center. *Centrifugal* force is a term used to denote the force which gives a revolving body a tendency to fly off in a straight line known as a *tangent*. A good illustration of this occurs when mud or water is thrown from the rim of a rapidly-revolving wheel. The *field* of a force is the area within which it acts. In the case of gravitation this field is infinite, but in mechanics it is restricted to the area within which a given force produces discernible effects.

FORCE BILLS, the name given to acts passed by the United States Congress at various times to force state compliance with Federal statutes. In 1833 such a law was aimed at South Carolina's effort to nullify the tariff act of 1832 (see **NULLIFICATION**). In 1870 another act made punishable by fine or imprisonment any attempt to intimidate, bribe or hinder qualified voters from expressing themselves at the polls. April 20, 1871, another bill, also known as the Force Bill, was passed by Congress, directed against the Ku-Klux Klan and similar societies, organized systematically to evade Federal laws in the South.

The name has also been applied to the Lodge election bill, passed by the House of Representatives in 1890, by which the control of certain elections was placed with the Federal government. It was defeated in the Senate.

FORCEPS, a two-pronged instrument used for grasping and picking up objects. It is one of the most useful of hand tools, and is made in a variety of forms and sizes to meet the varying needs to which it can be put. Forceps are used by dentists in extracting teeth, by watch makers in handling the small parts of watch works; by surgeons in grasping and holding parts while dissecting, in extracting splinters from wounds, and in other work of a similar sort.

FORD, HENRY (1863-), a Detroit automobile manufacturer who rose from a condition of poverty in middle age to become within twenty years one of the world's wealthiest men. He is credited with "putting America into automobiles," because he manufactured the world's lowest-priced car and shipped from his factory 6,000 complete cars every day. As a factory organizer he probably stands in the forefront of industrial leaders.

Ford was born in Greenfield, Mich., but removed to Detroit in 1887, where he learned the trade of machinist, and soon became chief engineer of the local electric light company. In 1903, after much toil in perfecting an internal-combustion engine, he organized the Ford Motor Company. This has grown to be the world's largest manufactory of automobiles. In 1914 he stirred the industrial world with the announcement of a vast profit-sharing plan with his employees. At this time \$5 per day became the minimum wage in his factories. An avowed pacifist,

he caused a mild sensation in 1915 by his attempt, through a voyage to Europe in a "peace ship," financed by himself, to achieve the immediate ending of the World War. In 1918, without taking part in the campaign, he was barely defeated for election to the United States Senate from Michigan.

During the World War Ford turned his factory resources over to the government, and immediately thereafter devised a simplified motor car of which 20,000,000 were sold before he consented to the production of a car more modern in appearance. He refused to sign the automobile manufacturers' code imposed by the National Recovery Act in 1933, but paid wages and met other conditions prescribed in the code.

FORD, PAUL LEICESTER (1865-1902), an American novelist and historical writer, was born in Brooklyn, N. Y. Of his novels the best known are *Janice Meredith* and *The Honorable Peter Stirling*. The latter is the story of a young attorney's struggles to gain recognition, and is said to be based on the life of Grover Cleveland. Among Ford's historical writings are *The True George Washington*, an original treatment of the subject in which the first President is pictured with all his physical defects and personal shortcomings, but lovable withal. *The Many-Sided Franklin* and *The Writings of Thomas Jefferson* are among others of this class. In a dispute over money matters Mr. Ford, who was a cripple, was shot by his brother Malcolm, who then committed suicide.

FORECLOSURE. See **MORTGAGE**.

FOREIGN MONEY. See **COINS**, **FOREIGN**.

FOREIGN PHRASES, *frases*. There are a number of phrases from foreign languages which appear occasionally in English writings, or are heard in current speech. The list below contains some of the more important, with their meanings. The following abbreviations are used: L. for Latin; F., French; It., Italian; Gr., Greek; G., German.

ad extremum (L.), to the last degree.
à la mode (F.), according to the fashion.
anno domini (L.), in the year of our Lord.
à pied (F.), on foot.
à propos (F.), suited to the occasion.
auf wiedersehen (G.), till we meet again.
au gras (F.), with or in fat.
au gratin (F.), with a crust.
au jus (F.), in the juice.
au revoir (F.), till we meet again.
beaux yeux (F.), pretty eyes; a fair face.
belle dame (F.), beautiful lady.

bête noire (F.), black beast; a thing to be
abhorred.
billet doux (F.), love letter.
bona fide (L.), in good faith.
bon ami (F.), good friend.
bon diable (F.), good-natured fellow.
bon jour (F.), good day.
bon mot (F.), clever saying.
bon soir (F.), good evening.
bon voyage (F.), a prosperous journey to
you.
caro sposo (It.), dear husband.
carpe diem (L.), enjoy the present moment;
embrace the opportunity.
caveat emptor (L.), let the buyer beware.
cave canem (L.), beware of the dog.
c'est à dire (F.), that is to say.
chacun à son goût (F.), every man to his
taste.
chemin de fer (F.), railway.
cher ami (F.), dear friend.
cherchez la femme (F.), look for the
woman.
cogito, ergo sum (L.), I think, therefore I
am.
comme il faut (F.), as it should be.
contrat social (F.), social compact.
coup d'état (F.), stroke of policy; unex-
pected, decisive show of authority.
cum laude (L.), with praise.
deo gratias (L.), thanks to God.
deus ex machina (L.), a god from the ma-
chine; any artificial handling of a sit-
uation.
ecco (It.), look here; look there.
enfant terrible (F.), terrible child.
en garçon (F.), as a bachelor.
en route (F.), on the way.
en suite (F.), in a series or set.
entre nous (F.), between us; confidentially.
ex cathedra (L.), from the chair; with au-
thority.
exeunt omnes (L.), all go out.
ex officio (L.), by virtue of one's office.
ex post facto (L.), from something done
afterward.
factum est (L.), it is done.
gaudeamus igitur (L.), let us then rejoice.
grâce à Dieu (F.), thanks to God.
grande dame (F.), great lady; a woman of
high rank.
grande toilette (F.), full dress.
grand monde (F.), refined society.
habeas corpus (L.), you are commanded to
have the body.
hoc loco (L.), in this place.
hoi polloi (Gr.), the masses.
homme d'affaires (F.), business man.
honi soit qui mal y pense (F.), evil be to
him who evil thinks.
honoris causa (L.), for the sake of honor.
hora fugit (L.), the hour flies.
ich dien (G.), I serve.
in excelsis (L.), in the highest.
in fine (L.), at the end.
in statu quo (L.), in the state in which it
was before.
lares et penates (L.), household goods.
le roi est mort, vive le roi (F.), the king is
dead, long live the king.

l'état, c'est moi (F.), I am the state.
le tout ensemble (F.), the whole taken
together.
locus in quo (L.), place in which.
ma foi (L.), upon my faith.
magna cum laude (L.), with great praise.
mal de mer (F.), seasickness.
meum et tuum (L.), mine and yours.
nez retroussé (F.), a turned-up nose.
noblesse oblige (F.), nobility obliges (one
to live up to certain standards).
nullus sum (L.), I am no more.
ora pro nobis (L.), pray for us.
par exemple (F.), for example.
pardonnez-moi (F.), pardon me.
parole d'honneur (F.), word of honor.
pax vobiscum (L.), peace be with you.
persona non grata (L.), a diplomat not ac-
ceptable personally to the sovereign or
government to which he is assigned.
pièce de résistance (F.), the principal work
in a collection; the most substantial dish
of a dinner.
place aux dames (F.), make way for the
ladies.
post bellum (L.), after the war.
pro bono publico (L.), for the public good.
pro patria (L.), for native land.
que voulez-vous (F.), what will you!
raison d'état (F.), reason of state.
raison d'être (F.), a reason for being.
rara avis (L.), rare bird; prodigy.
répondez s'il vous plaît (F.), reply, if you
please. (R. S. V. P.)
requiescat in pace (L.), may he rest in
peace.
res ipsa (L.), the thing itself.
resurgam (L.), I shall rise again.
sans souci (F.), without sorrow.
semper fidelis (L.), always faithful.
s'il vous plaît (F.), if it pleases you.
sine mora (L.), without delay.
sotto voce (L.), in an undertone.
sub rosa (L.), in strict confidence.
tempus fugit (L.), time flies.
tuum est (L.), it is thine.
uti rogas (L.), as you ask.
vanitas vanitatum (L.), vanity of vanities.
veni, vidi, vici (L.), I came, I saw, I con-
quered.
via crucis (L.), the way of the cross.
vive le roi (F.), long live the king.
volente Deo (L.), God willing.

FOREORDINATION, *fóhr* or *dínd' shun*,
a doctrine held by certain Protestant sects.
According to this belief every event in the
history of man is a part of God's purpose
and it is foreordained by Him. To take any
other view, they think, would be to imply
that God's knowledge and power are limited.
Wrongly interpreted, the doctrine is almost
as gloomy as fatalism (which see), or the be-
lief that events take place in a destined and
absolutely fixed order, that some persons
were created to sin and be damned, while
others were made to do good works and en-

joy eternal bliss. Foreordination was a fundamental of Calvin's theology.

FORESHORTENING, a principle in art which gives the illusion of space. In drawing and painting on a flat surface the artist can actually give his figures only two dimensions, length and breadth; he must furnish an illusion of the third by means of foreshortening; that is, if he wishes to represent realistically any object he must shorten all lines which are not perpendicular with a line from the eye of the spectator to the center of the picture. To illustrate: hold a six-inch pencil horizontally on a level with the eyes so that the ends will be the same distance from the eyes. Keeping it horizontal, turn it until a line starting between the eyes would pass through the lead from end to end. In changing its position the pencil appears to grow shorter and shorter. In its last position it would be foreshortened to the limit and correctly represented by a point. Foreshortening is further outlined in the article **DRAWING**.

FORESTERS, ANCIENT ORDER OF, a fraternal society, founded in 1745 in Yorkshire, England. It was introduced into the United States in 1832, the first court being organized at Philadelphia. There are now more than 9,000 courts, with a membership of about 1,600,000, of whom 50,000 were in the United States and Canada. There are in the United States three high courts and over 440 subordinate ones. Over \$5,000,000 is disbursed annually in benefits.

FORESTERS, INDEPENDENT ORDER OF, a fraternal organization, founded at Newark, N. J., in 1874, and reorganized in 1881. It has branches in Canada, Great Britain, Norway, France, India and Australia. There are now in the United States fifty-five high courts and 4,150 subordinate courts, representing a membership of 145,000. Nearly \$4,000,000 a year is disbursed in benefits at the present time; the total disbursements have been more than \$45,000,000.

FORESTERS OF AMERICA, a fraternal society which was organized under its present name in 1895. Originally it was a part of the Ancient Order of Foresters. It was introduced into the United States in 1882, and seven years later became an independent organization. The order has eighteen grand courts and 1,560 subordinate, and a membership of over 206,000. More than \$50,000,000 has been disbursed in benefits.



FORESTS AND FORESTRY. The poet Bryant in his *Forest Hymn* speaks of the forests as "God's first temples."

Ages ago the greater part of the earth's land surface was covered with trees, and it was in forested areas that primitive man began his long journey to civilization. The settlement of new lands as mankind has advanced to a higher plane has resulted in the destruction of vast numbers of trees, and to-day there are great open spaces which were once covered with dense forests. South America and Africa possess the largest tracts of untouched woodlands, and in North America the most extensive of these are in Canada, where there are 311,000 square miles of merchantable timber. The Federal and state forests of the United States (excluding private stands) cover more than 170,000,000 acres.

In Europe, Russia, Germany, Switzerland, Czechoslovakia, Austria, and Hungary have very large areas of woodland. In Asia, the densest forests are founded in India, on the southern slope of the Himalayas. Large forests also occur in Siam and Burma and in the northern part of the Chinese republic and Siberia. The kinds of trees most numerous in any particular forest depend upon the temperature, the amount of moisture and the nature of the soil. In the forests of the cold temperate climates cone-bearing trees, such as pine, spruce and hemlock, are the most numerous. These are usually interspersed with beech, maple, birch and other hard woods. In the warm temperate climate deciduous trees, such as the oak, prevail, while the forests of the tropical regions are characterized by numerous species of palms. Mingling with these are found mahogany, teak and climbing plants of gigantic size.

Value of Forests. In a general way it may be said that forests are of direct and indirect value; direct, through the produce which they yield; indirect, through the influence which they exercise on climate, the amount of moisture, quality of the soil, healthfulness and beauty of the country. It is clear that a piece of land without vegetation is exposed to the

tull effect of the sun, rain, snow and wind. If, on the other hand, the land is covered with a growth of plants and trees, it enjoys certain benefits which modify the effect on soil and air. These benefits are all due to the vegetable life; the crowns of the trees cut off the sun's rays and the falling rain; the leaves, flowers, etc., besides certain plants which grow in the shade of trees, form a layer of mold which protects the soil against rapid changes of temperature, and greatly influence the movement of water in it; the roots of the trees penetrate into the soil in all directions and bind it together.

The effects of these factors are more numerous than are generally recognized. The most obvious, probably, is the difference in temperature. A lower temperature tends to keep more moisture in the air, and consequently more rainfall is likely. In lowlands, it is true, the effects of forests on the amount of rainfall are probably very small, but in highlands they are quite noticeable. The vegetation tends to regulate the water supply by keeping the springs well-fed from surface water. A very important fact is that the roots hold the soil together so that the rich surface loam is not washed away by rains. The history of the United States is full of instances where hills and mountain slopes have been made useless for cultivation because the cutting down of the trees has left the fertile soil to be washed down. Where trees are planted near human habitation they reduce the velocity of the wind, protect buildings and adjoining fields, and offer shelter to animals and birds. There can be no question that forests add to the beauty of the country. Surely every man, woman and child will be happier if the surroundings are beautiful than if the country is a barren desert. All these effects of extensive forests deserve consideration. Whether one or the other is the more important is not the question at issue. The fact is that every country under the sun will be benefited by a wise care of its forests.

The direct utility of forests is in their produce, fuel and timber, also material for dyes, medicines and other useful articles. In modern times iron, steel, and concrete have to a large extent replaced timber for building, and coal, peat and similar materials are being substituted for firewood. But wood is still indispensable and seems likely to remain so. Even if no other motive than self-interest

dictates the policy of the owners of forests, it is wiser to take good care of the property. Most of the owners of great tracts now realize that the practice of forestry as a definite system is to their own advantage.

United States. The forest areas of the United States cover about one-fourth the entire area of the country, exclusive of Alaska. These forests may be divided into the eastern, western and lake regions. The eastern forest region includes the area covered by the Appalachian mountain system and the Gulf states, extending in some places west of the Mississippi River. In the northern portion of this region and extending as far south as Maryland, white pine is the most abundant and most valuable timber tree. However, in the higher latitudes, spruce, hemlock and fir, commonly known as Canada balsam, are found, and interspersed with these soft woods are maple, beech, birch and a few other hard woods. South of Maryland and continuing through the Gulf states, the yellow or pitch pine is the most abundant. Mingled with this are the cypress, the oak, the ash and a number of other hard-wood trees.

The forests of the lake region surround the Great Lakes and are found both in the United States and in Canada. In the United States they extend from near the Red River of the North, in Minnesota, eastward until they meet the forests of the Appalachian region of Canada. These forests cover large portions of Minnesota, Wisconsin and Michigan and are rich in white pine, the abundance of which has given rise to an extensive lumber industry in these states. Spruce and some varieties of hard wood are also found interspersed with the pine.

The Rocky Mountain forest region extends from the western boundary of the great plains to the Pacific coast and from the Canadian boundary to Mexico. The forests cover the foothills and sides of the mountains as far up as the tree line. They are often separated by wide, treeless regions, some of which are suitable for grazing, while others are barren. Various species of pine are the prevailing trees. On the western slopes of the Sierra Nevada and coast ranges, particularly the latter, the forests become very dense and contain trees of enormous size. The forests in this portion of the region are entirely different from those found in other parts of North America and con-

stitute the immense lumber regions of Washington and Oregon. The redwood, Oregon pine and species of fir and sugar pine are the timber trees most highly valued. Some authorities consider the forests of Oregon and Washington, in proportion to their area, the most valuable in the world.

Altogether, forest land in the United States cover about 450,000,000 acres, of which nearly one-third are on farms. The mountains and hills of Alaska are covered with a heavy growth of timber, but the trees are smaller than those found in Washington and Oregon. They are however suitable for lumber. In the Philippines there is a forest area of more than 40,000,000 acres.

Forestry. Forestry is the cultivation and management of forests, for the purpose of saving them from wasteful depletion, and of getting the most possible benefits out of them. Growing crops of trees so that there may always be timber available for use is an essential part of forestry. In most European countries all forests, whether private or public, are under government supervision and must be managed in accordance with carefully prescribed regulations concerning the cutting of timber, the planting of trees and the protecting of young growths.

Forestry in the United States. In early times there was practically no forestry management. As long as the forests existed they were looked upon as a free gift of nature, like air and water, and the early settlers in North America, and their descendants for many generations, cut down trees as if future needs were not worth considering. Moreover, forest fires were allowed to destroy more timber than fell before the woodman's axe. This disregard of the rights of future generations continued to a comparatively recent date. Though the Division of Forestry was established in 1880, it was not until 1897 and 1898 that it became anything more than an office for collecting figures. As early as 1873, Congress had passed an act granting land to settlers who planted one-fourth of their land with trees, but the act led to no immediate results. During President Cleveland's administration millions of acres of forest land were reserved by executive proclamation. Though the action was misunderstood and attacked, it had the good result of bringing the problems of national forest administration before the people. Since that time the bureau has been an active agency

for introducing the practice of scientific forestry on government and private lands and for the education of popular opinion. For a time the efficiency of the bureau was hampered by conflicts of authority with other departments. Finally, in 1905, these difficulties were overcome, and complete control of the federal-owned forest lands was given to the bureau of forestry, the name of which was changed to "Forest Service," a part of the Department of Agriculture.

The Forest Service. The first head of the bureau, or chief forester, was Gifford Pinchot, an ardent advocate of conservation, under whose direction the bureau took on life and vigor. He was succeeded by Henry S. Graves, he by William B. Greeley and he, in turn, by John D. Coffman. Headquarters is at Washington, but 2,200 of a total personnel of 2,500 are located in those regions of the country containing the 146 national forests whose protection and economic administration are the primary duties of the service. The major divisions of the service are forest management (including silviculture), grazing operations, finance and accounts, research, public relations, land, and engineering.

The organization of the Washington office is duplicated in eight branch offices with a district forester in charge in order to expedite business and place the actual control of the national forests in the hands of men on the ground, subject of course to the general policies formulated by the chief forester and assistant foresters in Washington. These branch offices are: Missoula, Mont., Denver, Colo., Albuquerque, New Mex., Ogden, Utah, San Francisco, Calif., Portland, Oreg., Washington, D. C., Juneau, Alaska.

The 146 national forests within the Continental United States contain 140,000,000 acres. In September, 1923, the Allegheny national forest was established in Pennsylvania, the first in that state. Large areas remain in other sections of the country which should be included in the national forests, chiefly valuable for timber production and watershed protection.

Land use and timber supply are the two problems which are most important in America's forestry situation. Studies recently made have emphasized the necessity of placing all forest land under intensive management so that larger timber crops shall be grown to relieve the timber scarcity which is

Outline on Forestry

I. PURPOSES

II. METHODS

- (1) Of national government
 - (a) Forest administration
 - (b) Research and experimentation
 - (c) Education of the people
- (2) Of the individual states
- (3) Of individuals

III. RESULTS

- (1) Creation and maintenance of national forests
- (2) Prevention of forest fires
- (3) Reformation of present methods of lumbering
- (4) Reforesting of denuded areas
- (5) Regulating the cutting of timber on national forests
- (6) Forest surveys
- (7) Hydrographic surveys
- (8) Supplying private owners of land with trees for planting
- (9) Sending foresters to lecture in universities and other schools

Questions on Forestry

What are some of the indirect advantages due to forests?

What uses are made of the barks of different trees?

From what trees are the following obtained: dyes, tar, turpentine, quinine, camphor, rubber?

Where is ebony procured? For what is it greatly valued?

What kind of trees would you expect to see were you to travel in Alaska? In Brazil? In the Philippine Islands? In the Hudson Bay country of Canada?

What can you say about the redwood trees of California?

What is the Forest Service? What is its purpose? What has it accomplished so far? How is it organized?

What causes forest fires? What means have been adopted to prevent them?

Does Canada or the United States guarantee better protection to its forest areas?

making itself manifest. Since 1880 virgin forests have been cut under the tremendous demand of growing industry much faster than the advance of farming could convert the cut-over lands into cultivated fields. Lumbering adds to the cut-over area at the rate of about 10,000,000 acres a year, and the amount of lumber manufactured for commercial use each year totals the tremendous figure of at least 34,000 million board feet. It has reached 44,150 million. To have this idle land produce timber crops is one of the prime requisites in meeting America's forestry problem. The country uses a total of 25 billion cubic feet of wood annually, while only 6 billion cubic feet is produced. With all forest land, about 470,000,000 acres, producing timber at maximum capacity this dangerous discrepancy could be overcome. This fact emphasizes the necessity of reforestation on a large scale, and as a permanent future policy. The acquisition of forest lands to protect watersheds of navigable rivers is gradually becoming an important part of the work of the Forest Service.

The importance of research work in all forestry matters and in the utilization of wood and wood products is increasingly evident as the country's wood supply dwindles. Two important forest experiment stations, at Amherst, Mass., and St. Paul, Minn., and six others previously established are engaged in the studies peculiar to the regions in which they are located. Among the subjects of study at these stations are,—protection of forests from fire, growth rates, water supply, erosion, tree slantings; uses and utilization of products of the forest, pulping processes, grading rules and specifications.

Fire is the "red enemy of the forests." In one recent calendar year the number of forest fires was 134,895, causing a loss of \$102,000,000. The total area burned was 31,000,000 acres, about one-fifth in the national forests. It is estimated that from eighty to ninety percent of all forest fires is due to *human carelessness*. Incendiarism, smoking, and camp fires were the principal causes.

A work of paramount importance is the eradication of tree diseases and insects. Another important duty of the foresters is the protection of game and fish in the forest preserves. Forest streams are restocked with desirable fish and sanctuary is provided for the growing number of big game animals, deer, elk, mountain goats and sheep.

FORESTS AND FOREST RESERVES IN CANADA.

Canada's original timber area has been reduced as settlement has proceeded westward. The early settlers, coming from Europe had practiced forest conservation at home, but in the New World the destruction of forests on the coast was at first a necessity and later a habit. In the southern portions of the provinces of Manitoba, Saskatchewan and Alberta and in the Peace River Valley, there is a prairie country which is absolutely treeless, except for small clumps of timber in the large river beds and on a few isolated hills. This treeless area covers about 200,000 square miles. Practically the whole remainder of the country was covered with timber when the earliest settlers landed at Quebec. In the maritime provinces and as far west as Manitoba was a great stand of pine; Ontario and Quebec had large bodies of hardwoods; from Nova Scotia to the Yukon was the great spruce belt; and on the Pacific coast was a coniferous forest containing the greatest amount of timber per acre of any forest lands in Canada.

The most important timber areas remaining are in the Pacific regions, where there are great virgin forests of spruce, hemlock and cedar. Between the Rocky Mountains and Hudson Bay there is a broad belt of spruce, tamarack and poplar. Canada's forest area has been variously estimated at from 500,000,000 to 1,500,000,000 acres.

Forest Reserves. In common with most European countries and in contrast to the United States, Canada is fortunate in that practically the entire forest area is owned by the Dominion or provincial governments. This has greatly simplified the problem of control. To prevent undue destruction of the forests, either by fire or by lumbering, is the reason for creating forest reserves. The reader should understand that timber may be cut under certain restrictions, but no settlements may be made on the reserves. The first Dominion reserve was the Banff National Park, established in 1885. Since that date there have been additions to the reserves, making a total of over 29,000 square miles. In 1930 the national resources of the Prairie Provinces were transferred to provincial control. This included some 33,000 square miles, which in large part have become Provincial Forests. The Dominion reserves are practically all in western provinces.

The Forestry Branch. The administration of the National Parks and the district forests is in the hands of a commissioner, who resides at Edmonton and reports directly to the superintendent of forests at Ottawa.

Forest administration in the provinces is carried on by a Department of Forestry or as a branch of a more extended service. The most important development in forest fire protection in later years has been in the use of aircraft for the detection and suppression of fires. Specially developed planes equipped with wireless are used in this service particularly in the more remote areas, while lookout towers and telephones are used in the more travelled forest areas. A large ground staff with equipment stored at strategic points is always available on call.

The coöperation of the government with private owners will result in the eventual solution of the second great problem in forestry—the planting of areas which are now comparatively or absolutely treeless. The securing of natural reproduction of a forest depends on the method of removal of the full-grown trees. The forestry branch aims to regulate the cutting of timber on forest reserves so that the conditions shall lead to the plentiful reproduction of the most valuable species. On burned-over land the foresters plan to secure the best results by using proper scientific methods. But the forestry branch aims not only to prevent undue destruction, not only to replace destroyed forests, but actually to create new timber areas. It is here that coöperation with private owners is most obvious, for the government supplies trees free of charge and tells the farmer how to take care of them.

The Dominion Department of Agriculture maintains large nurseries at Indian Head and Sutherland in Saskatchewan. About 7,000,000 trees are distributed annually to the farmers in the Prairie Provinces, for planting woodlots and windbreaks. About 120,000,000 trees were distributed up to 1932. Under simple conditions the trees are supplied free. Ontario has five nurseries and supplies 7,000,000 trees annually. Quebec has a large nursery at Berthierville which is equipped to supply 10,000,000 annually. The Governments of Ontario and Quebec are encouraging the establishment of communal forests by furnishing and planting the trees. In 1932 Quebec had 76 lots containing 594,059 acres.

Ontario had ten county forest plots of 1,000 acres each. In addition there were many smaller municipal plots.

FORGERY, *for'jur y*, the fraudulent making or alteration of a writing or instrument, to the prejudice of another man's rights. The punishment of forgery is by fine or imprisonment, or both. Not only have nearly all the states and provinces enacted statutes on the subject to supplement the old common law provisions, but Congress has passed additional laws; state laws must be made to conform to these.

FORGET, *for'ahay*, AMADEE EMMANUEL (1847-1923), a Canadian barrister and legislator, born in Marieville, Quebec. He began the practice of law in 1871. In 1875 he was secretary of the Manitoba Half-Breed Commission; from 1876 to 1888 he was clerk of the Northwest Council. For five years he was assistant Indian Commissioner for Manitoba and the territories, and from 1894 to 1898 was Commissioner. He richly deserved his promotion, in the latter year, to the Lieutenant-Governorship of the North West Territories, and when the province of Saskatchewan was organized in 1905 he became its first Lieutenant-Governor. At the end of his term of office in 1911 he was called to the Dominion Senate.

FORGET-ME-NOT, a common annual or perennial herb. Nearly fifty species are known. Its flowers are bright blue with a yellow eye.

The dark blue forget-me-not of the Azores is now cultivated in greenhouses and is much admired for its brilliancy. An interesting fact is that this plant is called "forget-me-not" in many languages, and that the flower is a symbol of friendship



FORGET-ME-NOT

throughout the world. The forget-me-not is sometimes called *scorpion grass*.

FORMALDEHYDE, a compound of oxygen, hydrogen and carbon, obtained by the oxidation of wood alcohol. In other words, formaldehyde is wood alcohol with the hydrogen removed. Pure formaldehyde is never obtained, the chemical process yielding a solution of 35 parts of formaldehyde to 65 parts of water. Formaldehyde solutions, often under the name of *formalin*, are used as disinfectants and in the manufacture of certain dyes and other chemicals.

FORMIC ACID, an acid so named because it was first obtained from the bodies of ants (Latin *formica*) by steeping them in boiling water. The same acid is contained in human sweat, in the common nettle and in other plants and may be prepared artificially in various ways. It is a colorless, volatile liquid, with pungent odor, and has economic uses as a food preservative.

FORMOSA, called by its inhabitants and by Japan **TAIWAN**, is an island in the Chinese Sea, belonging to Japan, and separated from the Chinese province of Fukien by a strait about eighty miles wide at its narrowest point. The island is about 250 miles in length and seventy miles in average breadth. The area is 13,839 square miles—somewhat exceeding that of Maryland.

It is divided by a central range of mountains, with peaks from 7,000 to 15,000 feet high, into a western and eastern part, the former of which is occupied by Chinese and is highly cultivated, producing in abundance corn, rice, sugar, pepper, camphor, oranges and bananas. The eastern part is inhabited mainly by wild tribes of the Malayan race, who are gradually disappearing before the Chinese. The chief exports are tea, camphor, sugar, indigo, coal and timber; the imports are cotton and woolen goods and liquid fuel.

The commerce of Formosa is largely with Japan. The camphor industry is a government monopoly. The Dutch exercised power over part of Formosa in the seventeenth century. It was ceded to Japan by China in 1895 at the close of the China-Japanese War. Population, 1930, 4,592,537. The chief town, Taihoku, has 230,490 people.

FORREST, EDWIN (1806-1872), an American actor, born in Philadelphia. He showed an early talent for the stage and in 1820 made his debut at Philadelphia, as the hero in Home's play of *Douglas*. In 1826 he

appeared before the New York public as Othello, with signal success. In 1836 he visited England, and he later made a second and a third visit. He continued with great success at New York till 1871, when he retired.

FORT. See FORTIFICATION.

FORT COLLINS, COLO., the county seat of Larimer County, seventy-four miles north of Denver, on the Cache la Poudre River and on the Colorado & Southern and Union Pacific railroads. The surrounding region is made fertile by an extensive system of irrigation. There is a beet-sugar factory, and there are also alfalfa mills and flour mills and an irrigation headgate plant. Fort Collins has the state college of agriculture and mechanic arts, and a 200-acre airport. There is a Carnegie Library and the headquarters of the state national forest service. The commission form of government has a mayor and three commissioners. Population, 1930, 11,489; these figures showed an increase of 40 per cent in a decade.

FORT DEARBORN, a fort built on the site of the present city of Chicago in 1804 (see CHICAGO, subhead *History*). It was the scene of a massacre on August 15, 1812, when the garrison of 67 men and some thirty settlers evacuated the fort under orders from General William Hull. They were attacked in ambush by a force of 500 Indians, assisted by others who had promised to escort them to safety, and fully two-thirds of the party were killed. The fort was destroyed on the following day by the Indians, was rebuilt in 1816 and demolished in 1856.

FORT DODGE, IOWA, the county seat of Webster County, eighty-seven miles northwest of Des Moines, on the Des Moines River and on the Illinois Central, the Chicago Great Western, the Fort Dodge, Des Moines & Southern and the Minneapolis & Saint Louis railroads. Extensive deposits of gypsum are found here, and the city has one of the largest gypsum mills in the world. Other manufactures include brick, men's work clothing, tents and awnings, electric folding doors, cleansing powders, soft drinks, and biological products. There are large coal deposits in the vicinity, also deposits of glass sand and sandstone. The city has six city parks, a Carnegie Library, two hospitals, and a courthouse. The government is on the mayor and council plan. Population, 1930, 21,895.

FORT DON'ELSON. See FORT HENRY AND FORT DONELSON.

FORT DUQUESNE, *du kane'* a fort erected by the French in 1754, at the junction of the Allegheny and Monongahela rivers in Pennsylvania. It became at once the center of French military authority in the region drained by the Ohio River and its tributaries. It was for the purpose of reducing this fort that the expedition under General Braddock set out in 1755 (see BRADDOCK, EDWARD). Another English expedition of 800 men, for the same purpose, was almost destroyed in October, 1757, but the fort was finally captured in September, 1758. The name of the fort was changed to Fort Pitt, in honor of the great English statesman, and later the city which grew up on the spot was named Pittsburgh.

FORTH, an estuary of Scotland. The river is formed in Perthshire by the junction of two streams, the Duchray and the Dhu, about one mile west of Aberfoyle. From Aberfoyle the river flows southeasterly, forming for a considerable part of its course the boundary between the counties of Stirling and Perth, winding in its lower course in a series of curves, and expanding into the Firth of Forth, which forms the most important harbor or refuge north of the Humber. The Firth is fifty miles long and fifteen miles across. At Queensferry a great cantilever bridge crosses the Firth.

Forth Bridge, a railway bridge across the Firth of Forth, in Scotland. It is of the cantilever type (see BRIDGE, subhead *Cantilever Bridges*) and on account of the length of its spans is one of the most remarkable bridges in the world. It has two short arms of 680 feet each, two main spans of 1,710 feet each, fifteen spans of 168 feet each and seven small arches. The total length is 8,295 feet, or one and a half miles, one mile of which is covered by the cantilevers. The highest point is 361 feet, and the center of the bridge is 152 feet above high water. This bridge was completed in 1889 at a cost of \$13,000,000.

FORT HENRY AND FORT DON'ELSON, two forts in Tennessee, near the Kentucky border, the first situated on the right bank of the Tennessee River and the second on the left bank of the Cumberland River. They were erected by the Confederates in 1861 and were important posts, controlling the entrance to avenues of approach to the

Central and Southern states. February 6, 1862, General Grant and a land force, assisted by Commodore Foote's river fleet, compelled the surrender of Fort Henry. Most of the garrison escaped to Fort Donelson. Grant advanced upon the latter on the 12th, and began a vigorous bombardment on the 15th, supported on the following day by a bombardment of the fleet. In the night Generals Floyd, Pillow and Forrest, with about 2,000 men, escaped, leaving Buckner in command. On the following morning, Buckner proposed an armistice and requested the terms of surrender. To this Grant made his famous reply, "No terms except unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." Buckner at once surrendered fully 15,000 men and a large quantity of ammunition.

FORTIFICATION, the science of strengthening positions in such a way that they may be defended by a body of men much inferior in number to those by whom they are attacked; and more particularly, the science of strengthening positions so that they may be held against the assault of troops supported by artillery. Fortifications are usually classed as permanent or temporary. *Permanent* fortifications are works required to remain effective for a considerable time, for the purpose of defending important positions and cities, dockyards or arsenals. *Temporary* fortifications are such as are designed merely to throw temporary obstacles in the way of an advancing enemy. Modern scientific fortification had its beginnings in the work of the great French engineer Vauban, who worked under the direction of Louis XIV.

Permanent fortifications are constructed on the principle that each part must support and must be supported by some other part; that the works must protect the defenders from the enemy's fire as well as possible, and that the fire of the fortress must completely sweep all parts of the area in front of the fortified lines. Permanent fortifications are now constructed of steel and great walls of concrete. There were numerous forts in Europe early in 1914 that were believed capable of resisting any effort of an enemy, however strong in offensive machinery, to reduce them. In August of the same year it was known that no fort existed which could withstand the greatest guns of a strong mili-

tary power. The event which forced this conviction upon the world was the attack of the Germans in the first month of the World War upon the supposedly impregnable fortresses of Liege, in Belgium.

Temporary, or field, fortifications vary much, according to the time allowed for construction and the length of time during which they may prove useful. Most important of such fortifications are the elaborate trench systems which were employed in the World War. Carrying the trench system to its logical development, great steel and concrete dug-outs were built thirty to forty feet underground. These latter offered safety from any kind of gunfire, and could be taken only by intrepid raiding parties. The trenches were narrow ditches extending downward about eight feet; they gave temporary shelter from light gunfire. A very shallow trench, with the earth thrown to the front, so as to afford shelter to one man lying in it, may be made in somewhat less than half an hour; more elaborate forms require more time. By placing a man at every four feet, active troops can make a fair shelter for themselves in an hour.

To impede the enemy's advance, an abatis of felled trees may be used, also wire entanglements. Barbed wire stretched in many lengths in front of defenders' positions comprises an element of safety against surprise attack. If the enemy endeavors to cut such wires there is a possibility of discovery and therefore of prompt measures towards defense.

FORT MADISON, Iowa, the county seat of Lee County, eighteen miles southwest of Burlington, on the Mississippi River and on the Atchison, Topeka & Santa Fé and the Chicago, Burlington & Quincy railroads. The city has railroad shops, flour and lumber mills and manufactures of agricultural implements, paper, waxed paper, a great pen company. Here is the state penitentiary and the Catermole Memorial Library. The Santa Fé Railroad has a hospital here, and there is also Sacred Heart Hospital. A Federal building and postoffice rank among the important buildings, and there are three bank buildings. There is a business college and an emergency landing field. Fort Madison was settled on the site of a fort which had been built on the bank of the Mississippi in 1808. Population, 1920, 12,066; in 1930, 13,779, a gain of 14 per cent.

FORT MIMS, MASSACRE OF, a massacre perpetrated during the Creek War at Fort Mims, near Mobile, Ala., Aug. 30, 1813. The garrison, including about 550 men, women and children, was surprised by a greatly superior force of Indians under Wethersford, a half-breed. All except fifteen were killed.

FORT MONROE or **FORTRESS MONROE**, a military post of the United States, at Old Point Comfort, Elizabeth City County, Va., at the entrance of Hampton Roads. It is on a reservation of about 300 acres, and is the headquarters of the Chesapeake Bay coast defense. Hampton Roads is the headquarters of the Atlantic fleet of the United States navy. Fortress Monroe was important during the Civil War; here Jefferson Davis was imprisoned.

FORT MOULTRIE, *mole'tre*, a fort on Sullivan's Island, at the entrance to the harbor of Charleston, S. C. Early in the Revolutionary War a force of British regulars under Sir Henry Clinton and a fleet under Sir Peter Parker proceeded to Charleston with the view of using the city as a base of operations for the isolation of the Southern colonies. Upon arrival they were confronted by a force of 6,500 Americans, about 450 of whom were under Colonel William Moultrie and were stationed in a fort known as Fort Sullivan, on Sullivan's Island. Parker opened fire upon the fortress; but after a contest of more than ten hours the British were forced to withdraw and to abandon temporarily the invasion of the South. The name of the fort was later changed to Fort Moultrie. It surrendered to the British, May 7, 1780.

A United States garrison occupied Fort Moultrie at the opening of the Civil War, but on December 26, 1860, Major Anderson removed the troops to Fort Sumter, which was better prepared to withstand a bombardment. The South Carolina militia thereupon took possession of Fort Moultrie and used it in the defense of Charleston.

FORT NIAGARA, a fort on the American side of the Niagara River, near its mouth, upon the site of a trading post built by La Salle about 1669. In 1725 a Frenchman, Vaudreuil, built Fort Niagara, which became the most important military station and the greatest trading center of inland America. It was attacked during the French and Indian War by a British expedition, and was captured by another expe-

dition in 1759. It was the center of British influence among the Indians during the Revolution, and many expeditions against the frontier were directed from this point. It was evacuated by the British in August, 1796, and was immediately occupied by the Americans. During the War of 1812 it was bombarded and was captured by the British December 19, 1813, but was again surrendered after the close of the war. The United States garrison was withdrawn in 1826.

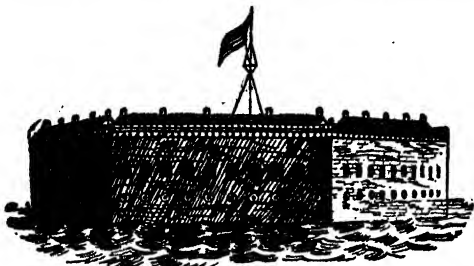
FORTRESS MONROE. See **FORT MONROE**.

FORT SCOTT, KAN., founded in 1843, is the county seat of Bourbon County, 100 miles south of Kansas City, on the Marmaton River and on the Missouri Pacific, the Missouri, Kansas & Texas and the Saint Louis & San Francisco railroads. The city has foundries, machine shops, flour mills, a condensory company, a hydraulic cement company, and also makes pottery and mattresses. The city is in a region having deposits of coal, flagstone, cement rocks, mineral paints, zinc and lead. It supports a public library and two hospitals. There is a fine Federal building, and near the town is a national cemetery. There are two parks and a municipal airport. Fort Scott became a city in 1860; the commission form of government is in operation. Population, 1910, 10,463; in 1920, 10,693; in 1930, 10,763.

FORT SMITH, ARK., one of the county seats of Sebastian County, at the junction of the Arkansas and Poteau rivers, on the Saint Louis & San Francisco, the Missouri Pacific, the Arkansas Central, the Kansas City Southern, the Fort Smith & Western, Midland Valley, and the Missouri Pacific railroads. The city has sawmills and cottonseed-oil mills and extensive manufactures of furniture, wagons and refrigerators. It has a large trade in coal, cotton, lumber, live stock and hides. Fort Smith was settled in 1838 and was chartered as a city in 1886. There are numerous costly business buildings, a Carnegie Library, a Masonic Temple, junior college, two hospitals and a fine union railroad station. The commission form of government is in operation. There is an airport and a radio station. Population, 1920, 28,811; in 1930, 31,429.

FORT SUMTER (named after Thomas Sumter, a leader in the Revolutionary War), a fort at the entrance to Charleston Harbor,

S. C. When South Carolina seceded in December, 1860, Major Anderson, who commanded the defenses in the harbor, abandoned the other forts and occupied Fort Sumter, with a garrison of eighty men. On April 12, 1861, after unsuccessful negotiations between Anderson, the South Carolina authorities and the government at Washington, General Beauregard opened fire on the fort, which surrendered on the 14th of the same month. This was the beginning of the Civil War. The Confederates greatly strengthened the fort, and it resisted several attacks, but was evacuated in February, 1863.



FORT SUMTER—BEFORE THE CIVIL WAR

On April 14, 1865, Major (then General) Anderson raised the same United States flag over the fort that he had lowered exactly four years before. It has been rebuilt on a modified plan.

FORTUNA, in classical mythology the goddess of chance. In Greece she was called Tyche, and Hellenic poets and sculptors represented her with a cornucopia, a symbol of prosperity. She differed from Destiny, or Fate, in so far that she gave and took away at her own pleasure and without regard to law. She was the "bringer of good and evil fortune," and was long zealously worshipped. There were temples to her in all parts of Greece and Rome, after the reign of Servius Tullius, with whom her vogue originated.



FORTUNA

FORT WAYNE, IND., 150 miles nearly east of Chicago on the Saint Joseph and Saint Mary's rivers which join here and form the Maumee. It is on the Indiana Railroad System, the New York Central, the

New York, Chicago & Saint Louis, the Pennsylvania and the Wabash railroads. It is also served by several bus lines and two airports. The principal buildings and institutions are Shrine Temple Auditorium, the Masonic Temple, Catholic Community Center, the Y.M.C.A. and Y.W.C.A., Concordia College, International Business College, extension schools of Indiana and Purdue universities, Fort Wayne and Allen County Historical Museum, three large hospitals and 77 churches. Population, 1930, 114,946.

FORT WILLIAM, a city of Ontario, situated on the northern shore of Lake Superior and on the main lines of two great railways, the Canadian Pacific and Canadian National, 419 miles from Winnipeg. The first settlement was made by French traders in 1669. Its railways and excellent harbor at the head of Great Lakes navigation give the city great commercial importance, and it is one of the largest traffic centers of Canada.

About 3,000 vessels, with an aggregate tonnage of 8,000,000, enter and clear from its docks annually. The grain elevators have a total capacity of 92,830,000 bushels. The chief manufactures consist of flour, oatmeal, iron pipe, car wheels, tinware, brick, tile, brooms, wire nails, hardwood finishings, lumber, cigars, cheese, harness and aerated waters. Population, 1931, 26,277.

FORT WORTH, Tex., the fourth city in size in the state and the county seat of Tarrant County, 30 miles west of Dallas, on the Trinity River, and on the Chicago, Rock Island & Gulf, the Missouri Pacific, the Texas & Pacific, the Fort Worth & Denver City, the Gulf, Colorado & Santa Fé, the Saint Louis Southwestern, the Saint Louis-San Francisco and the Missouri Kansas-Texas railroads. There are also one airport and ten bus lines serving the city. The region is largely devoted to stock-raising and cotton. More than 500 manufacturing plants and wholesale houses handle or produce articles listed in 700 classifications. The city maintains Texas Christian University, Texas Woman's College, a Baptist theological seminary, a Masonic orphans' home, a Carnegie library, six hospitals, 220 churches and 47 parks. The beginning of Fort Worth was a military camp, established on the present site of the city in 1849. A later settlement became the County seat and was incorporated in 1873. In 1907 the commission form of government was adopted, and in 1925 the

city manager system was substituted. Population, 1930, 163,447.

FORUM, among the Romans, any open place where the markets and courts of justice were held. There were a number of such places in Rome, the most celebrated, by far, being the great Roman Forum, between Mount Palatine and the Capitoline Hill, which formed the political and commercial center of the city. Surrounding this were the temples of Saturn and of Concord, the Basilica Porcia, the first courthouse, built in 184 B. C., and many other beautiful buildings. Though this Forum escaped the devastations of the fifth century, it became almost a waste in the Middle Ages, but of late years the government has made clearances and excavations and has taken charge of the valuable relics which are left. In legal phrase, *forum* signifies the court or place where an action is instituted.

(For location of the Roman Forum, see full-page illustration Rome, the Eternal City, in article Rome.)

FOSDICK, HARRY EMERSON (1878-) a distinguished Baptist clergyman. He was born in Buffalo, N. Y. He graduated from Colgate university in 1900 and from Union Theological Seminary in New York in 1904. He was pastor of the First church, Montclair, N. J., 1904-15. He became instructor in homiletics at Union Theological Seminary in 1908 and was transferred to the chair of practical theology in 1915. He was special preacher at the First Presbyterian church in New York, 1918-25 and later pastor of the Park Avenue Baptist church in New York. The magnificent Riverside Drive Baptist church was built so as to provide a metropolitan pulpit with the largest possible outreach into national life. Dr. Fosdick was chosen as the first pastor.

His principal publications, representing a liberal modernist view with very strong spiritual accent, include *The Second Mile*, *The Manhood of the Master*, *The Meaning of Prayer*, *Adventurous Religion*, *A Pilgrimage to Palestine*, *Spiritual Values and Eternal Life* and many others.

FOSFIL. Fossils are petrified forms of plants and animals, found in the rock formations of the earth. Most of them represent species that have long since been extinct, and their study is of the greatest importance to the geologist, since they reveal to him the forms and conditions of life at different

periods in the world's history. From the study of fossils we know that the simplest forms of life are those which first appeared and that all life can be traced to one-celled organisms.

From these simple forms both vegetable and animal life increased in complexity and importance as conditions for the existence of higher orders appeared. The animal fossils are more easily traced than the plant fossils. A study of these shows that no vertebrate animals appeared before the Silurian period, and during the latter part of this and the Devonian period the fishes reached their highest development. These were followed by the reptiles, which in turn were followed by birds, and these by the mammals, which were the progenitors of existing species. The study of fossils also shows that each period in the world's history has been characterized by some special form of life, which at that time reached its highest development; thus, the fishes distinguish the Devonian age, and the reptiles, the age that followed. A study of the fossils of plants shows the same progress from the simplest forms to existing species. Fossil study is known scientifically as paleontology. See GEOLOGY.

FOSTER, STEPHEN COLLINS (1826-1864), one of the greatest of writers of popular songs that the world has produced. While his songs are distinctly American, some of his melodies are today among the musical treasures of unlettered tribes as far away as the center of Africa. His verses suggest negro folk songs, but the designation is incorrect. He did not live in the South; his only knowledge of negro life was gained from study of the colored race in camp-meetings and the like, and from one brief visit to Kentucky, which inspired *My Old Kentucky Home*, a plaintive and haunting melody that will outlive most modern songs.

Only a few of his other songs can be named in brief space. *Oh Susannah* was especially popular with pioneers over the long trail to the "golden West," and it was the theme song of the moving-picture classic, *The Covered Wagon*. For *The Old Folks at Home* (popularly *Suwanee River*), he received only \$500; the publishers netted thousands of dollars from it. The little, unromantic Suwanee River in Florida Foster never saw. He chose its name through a search in geographies for a word which would blend melodically into

the verse he was writing. *Old Uncle Ned* and *Old Black Joe* are other negro classics; still others whose fame will endure as long as the love of musical harmonies is found in the souls of men are *Massa's in de Cold, Cold Ground* and *Uncle Ned*. A song in another vein, as popular today as when written, is *Come Where My Love Lies Dreaming*.

Foster was born near Pittsburgh, Pa. Before his brief life ended he had written more than 150 songs, and for nearly all of them he provided both words and music, though not trained in music. His life was unhappy; at times he was given to excessive drinking, and a marriage proved disastrous. His last years were spent in poverty.

FOUCAULT, *foo ko'*, JEAN BERNARD LEON (1819-1868), a French physicist. His name is especially connected with a celebrated pendulum experiment, employed as a method of showing the rotation of the earth on its axis. He also made important discoveries in optics, electric lighting and photography and invented the gyroscope and the polarizing prism which bears his name.

FOUNDING, the art of casting iron, steel, brass and some other metals into various shapes. The place where castings are made is called the *foundry*. The process of making iron castings practically illustrates that of all other metals. A pattern of the article is first made of wood, aluminum or brass; the latter two are increasingly popular, but most patterns are of wood. The pattern, if of wood, is a little larger than the object, to allow for shrinkage, and is so constructed that it can be taken from the mold in parts if necessary. The mold is usually a box in two parts. The pattern is set in one part, and molding sand, which is a sand of very fine grain, is tightly packed around it. The other part of the mold is then added, and the process of packing the pattern is completed. When this is done, the mold can be opened and the pattern removed without disturbing the sand, thus leaving a perfect mold of the article to be cast. Holes for pouring in the metal are cut through the sand. The iron is melted in a furnace, called a *cupola*, which is a cylindrical iron furnace, lined with fire brick. It has tuyeres, or small pipes, near the bottom, through which the blast enters (see IRON; STEEL).

The melted iron is poured into ladles, from which it is poured directly into the molds. Complicated castings require patterns in

several parts and call for great skill in molding.

FOUNTAIN, a natural spring of water; also an artificial basin containing water for drinking or such a basin connected with an arrangement of pipes through which water flows in ornamental jets. The operation of fountains is based on the following principle: If water confined in a pipe or crevice is under heavy pressure from one end, it will, if released from the other end, gush out with a force corresponding to that pressure. Water piped from a mountain lake to a valley will rise to a height nearly level with its source, being under pressure of gravity.

The Greeks and Romans had many fountains of the gravity type, and remains of them are numerous among their ruins. Their fountains were designed to ornament public parks and squares and to supply the people with water for household purposes. The fountains in modern cities are produced by pumps operated by machinery, that is to say, those which furnish the regular water supply. One of the most beautiful of modern municipal fountains is the bronze *Tyler-Davidson* fountain at Cincinnati, Ohio (see CINCINNATI). Another is the very handsome *Spirit of the Great Lakes*, designed by Lorado Taft. Its five bronze female figures, each with a large shell-basin from which she pours water into a basin below, typify the five Great Lakes. This fountain stands in Grant Park, Chicago. Among the most famous fountains of Europe are the *Schöne Brunnen*, at Nuremberg, Germany; the *Fontana Maggiore*, at Perugia, Italy; the *Fontaine des Innocents*, in Paris, and the fountains and cascades at Versailles and Saint Cloud, in France, and the *Alameda Fountain*, at Malaga, Spain.

Some of the most famous fountains of recent date have been constructed for great expositions. Among these are the *Fountain of the Republic*, by Macmonnies, at the World's Columbian Exposition in Chicago in 1893; the fountains of *Man, Nature and Progress*, at the Pan-American Exposition in Buffalo in 1901, and the *Cascades*, at the Louisiana Purchase Exposition at Saint Louis in 1904; and the *Fountain of the Earth*, by Robert Aitken, and *The Fountain of Energy*, designed for the Panama-Pacific Exposition in 1915.

FOUNTAIN OF YOUTH. It was the belief of many people in medieval and early

modern times that somewhere there existed a fountain that would bring back youth to the aged, if they could but drink of its waters. It was the search for this miraculous fountain that brought Ponce de Leon and his followers and possibly other Spanish explorers to America.

FOUR-O'CLOCK, an old-fashioned and common plant, first known in South America, so called because its blossoms open late in the afternoon. The plant is bushy and grows to a height of about two feet. The blossoms grow on the ends of the branches, and flowerets of different colors often grow on the same branch. They stay open all night and close in the morning, never to open again. The plant is a steady bloomer from early summer until the months of frost.

FOURTH OF JULY. See INDEPENDENCE DAY.

FOWL, a word originally synonymous with *bird*, now used in a stricter sense to designate a family of birds of which the common domestic fowls, the cock and hen, are familiar examples. The general form and characters of the bill and feet agree with those of the pheasants, but the crown of the head is generally naked and is furnished with a fleshy comb; the base of the lower mandibles also bears fleshy lobes, or wattles, which are most conspicuous in the males. The legs of the male are furnished with spurs, which are much used in conflict, the cocks being particularly quarrelsome and unable to suffer the presence of a rival. In the center of the cock's tail are two long feathers, which fall backward in a graceful arch and add great beauty to the whole aspect of the fowl. Except in the pure white breeds, the plumage of the cock is always more splendid than that of the hen. All the species are natives of the East Indies and the Malay Archipelago. See PHEASANT; POULTRY.

FOX, an animal belonging to the same family as the dog and the wolf. It is one of the smaller members of the family, and is famed for its cunning. From this trait has come the term, applied to a person, whether complimentary or otherwise, that he is "as sly as a fox." The stories told of the animal's intelligence in eluding its enemies, in protecting its young and in securing its food are sometimes so strange as to be almost beyond belief. The fox is a native of almost every part of the globe and is everywhere known as the most wily of beasts of prey.

It has a straight, bushy tail, erect ears and is extremely alert and avaricious, devouring birds and small quadrupeds, fruits, honey and



RED FOX

eggs. The fox's home is a dry burrow or hole in the rock, and usually consists of an outer hole, or room, where the fox lies, a store room, where he keeps his food, and behind all, his sleeping room and the place where his family lives. When the fox is captured he will sometimes feign death and will endure the roughest treatment without flinching.

Besides the common fox of Europe and Asia, there are the *blue fox* of the Aleutian and other Arctic islands, notable for its beautiful bluish fur, one of the most valuable furs in the market; the *black fox*, a native of the northern parts of Asia and America, similar to the common fox, but distinguishable by its rich, shiny, black fur; the *gray fox*, once very common through the northern parts of America, characterized by the thick tail, at the tip of which is a tuft of stiff hairs; the *red fox*, of America, generally of a pale yellow color, but in the winter almost pure white, especially in the Arctic regions; the *crossed fox*, whose fur is gray on the upper parts and black beneath and on the muzzle, with a dark cross over the shoulders, and the *swift fox*, a former inhabitant of the western American plain.

The *silver-black fox* has become of great economic importance because of the beauty of its fur. The story of the growth of the industry of raising these foxes for their valuable pelts is told in the article FUR FARMING.

FOX, a tribe of Indians belonging to the Algonquian family, now scattered over Oklahoma, Iowa, Kansas and Nebraska. They called themselves *Meshkwakihug*, or *Red Earth People*, the name Fox having been applied by the French. In 1760 the tribe united with the Sac Indians (see SAC). They now number about 700.

FOX, CHARLES JAMES (1749-1806), an eminent English statesman and orator. From his first election to Parliament in 1768 he was recognized as a man of promise. He was a member of North's ministry from 1770 to 1773 and of Rockingham's in 1782. He was a close friend of Burke and was one of the chief opponents of the war with America, the outcome of which he clearly foresaw. As an admirer of Napoleon and an opponent of the war with France, Fox was the great rival of Pitt. Among orators, Fox was of the first class, although in eloquence and brilliancy he did not perhaps equal Pitt, Burke and Sheridan. His private life was marred by vices, but these he never allowed to interfere with the performance of his public duties.

FOX, GEORGE (1624-1691), the founder of the Society of Friends, or Quakers, was born at Drayton, in Leicestershire, England. In his youth he was apprenticed to a shoemaker, but he soon began to wander from place to place, preaching and otherwise laboring for religious reforms. He went on many missionary journeys to Iceland, Scotland, Holland and North America—and made numerous converts. He declared that the source of divine truth was not the Scriptures, but the Spirit of God. For this opinion he was frequently imprisoned, but continued to gain followers. These were first denominated *Quakers*, in consequence of their trembling mode of delivery and their calls on the magistrates to "tremble before the Lord."

FOX, JOHN, JR. (1863-1920), an American novelist, born in Kentucky, and in 1883 graduated from Harvard University. Many of his novels deal with mountaineer life of the Southern states. His best known books are *The Heart of the Hills*, *The Little Shepherd of Kingdom Come*, *A Mountain Europa*, *Following the Sun Flag*, *The Kentuckians* and *The Trail of the Lonesome Pine*, the last successful also in dramatized form. In 1921 appeared *Erskine Dale*, *Pioneer*, a posthumous novel. In 1908 Mr. Fox married the actress Fritzi Scheff, who divorced him.

FOX'GLOVE, a beautiful flowering plant bearing thimble-shaped flowers, arranged in crowded clusters on a spike. Its leaves and stems are the source of a bitter drug called *digitalis*, which is the Latin name of the plant. This word means *finger*, and refers to the peculiar shape of the rose, lilac, yellow

or white flowers. *Digitalis* is used as a stimulant for weak heart action, but is dangerous if taken in large doses. The foxglove is native to Europe, and is now found in various parts of America, where it is cultivated as a garden flower.

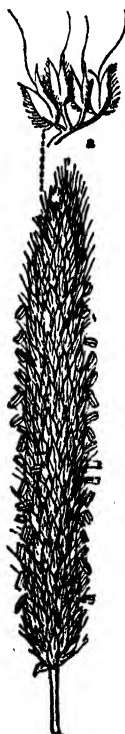


FOXHOUND

FOX'HOUND, a high-spirited hound that has a keen scent, remarkable perseverance and great endurance. It is easily trained and becomes very skilful in hunting foxes. Somewhat smaller than the staghound, the foxhound seems to be a cross between the staghound or the bloodhound and the greyhound. It is commonly of a white color, with patches of black and tan, has short hair, large and straight limbs and large, thin ears. Its usual height is about twenty inches.

FOX'TAIL GRASS, the common name given to certain grasses, because of the shape of the large clusters in which the flowers are arranged (see illustration). The meadow fox-tail grass is an abundant natural grass in meadows and pastures and is an excellent fodder plant. Other species, however, are dry and harsh, not only valueless, but sometimes troublesome weeds, especially in clover fields.

FOX TERRIER, a small dog with long, flat and rather narrow head, strong jaws and small V-shaped ears. It has become almost universally a household pet, especially in America, Canada and England. The nose is black, the eyes small and the body strong. The color is

FOXTAIL GRASS
a. spikelet in bloom

usually white, with black or tan markings. The fox terrier was formerly used to drive foxes from their holes, hence the name. These dogs live about fifteen years, and their weight averages twenty pounds. The illustration is that of the more popular smooth-coated terrier; some have hair that is hard and wiry. See Dog.



FOX TERRIER

FRACTION, in arithmetic and algebra, one or more of several equal parts into which a whole number is divided; also the written expression of this quantity.

For a discussion of fractions in arithmetic, see the article Arithmetic, subtitle Fifth Year.

FRANC, a modern silver coin and money of account, which since 1795 has formed the unit of the French monetary system and has also been adopted as the unit of coinage by Belgium, Switzerland and several other nations. Its standard value for many years was 19.3 cents in United States money and about 9½ pence in English money. It is divided into 10 *decimes* and 100 *centimes*. The *sou* is equivalent to 5 centimes. The French coinage also includes 2-franc, 5-franc, 20-centime and 50-centime pieces, in silver, and 5-franc, 10-franc, 20-franc, (the Napoleon), 50-franc, and 100-franc pieces in gold. After the World War, the franc was heavily depreciated and in 1928 was stabilized at 3.9 cents in value.

FRANCE, ANATOLE [Jacques Anatole Thibault] (1844-1924), a French author, was born in Paris, and educated at the College Stanislas. He was a man of great learning, a great lover of beauty in art and literature, with a sceptical turn of mind, which colored much of his literary efforts. Whatever his theories, he was a deep student of human nature. For many years French literature was dominated by his fame. In 1921 he received the Nobel Prize for Literature. His works include: *Le crime de Sylvestre Bounard* (1881); *Thais* (1890); *La vie littéraire* (1893); *Le lys rouge* (1894); *L'Île des péngouins* (1908); *Vie de Jeanne d'Arc* (1908); *Les dieux ont soif* (1912); and his reminiscences, *Le petit Pierre* (1918).



Statue of the Republic

FRANCE, a republic in the west-central part of Europe, the first one of the great powers of that continent to abolish permanently its monarchical form of government. There is a well-known saying, sometimes accredited to Victor Hugo, that every man loves two countries, his own and France. A basis of truth is here. Americans, while first in loyalty to their homeland, felicitate France because it "has put the beautiful into the life of the common people, into the clothes they wear, into the books they read, until the beautiful, that was once concentrated in palaces, is now diffused through the comforts and conveniences of common life." France elicits admiration because it displays indomitable will in most depressing situations. For example:

When, at the close of the Franco-German War (1871) France found itself facing the loss of two of its richest provinces and the payment of a huge indemnity, the unfortunate nation had the respect and sympathy of the whole world. That kindly feeling deepened as the other nations saw the resolute way in which the French people paid the indemnity, and proceeded to work out the many problems connected with the change in government. The Third Republic, then established, has endured and won friends the world over, and it did not look in vain for help when the great war of 1914 threatened its very existence.

In that life and death struggle France suffered cruelly, and bore the heaviest blows delivered by a relentless enemy. Though but one-ninth of its territory was conquered, that portion represented the heart of its industrial life. It supplied the greater part of the nation's wool, flax, iron ore, pig iron, steel and coal. The war destroyed seventy per cent of the factories of the country, and 450,000 private homes, besides scores of towns and cities, and beautiful structures—cathedrals, libraries, administrative buildings and other public edifices. When the terrible loss in life, health and vitality is also counted, one can appreciate the magnitude of the reconstruction problem of France for years to come.

Location and Size. France is the most westerly country of Central Europe, and lies in about the same latitude as Maine. It has about 2,000 miles of coast line, with the Mediterranean Sea touching it on the south, the Bay of Biscay and Atlantic Ocean on the west, and the English Channel and Strait of Dover on the northwest. Along the greater part of the southern boundary of France rise the summits of the Pyrenees, a strong barrier between it and Spain. Belgium bounds the country on the northeast, and on the east lie Germany, Luxembourg, Switzerland and Italy. Several mountain ranges extend along the eastern boundary, and France is thus shut in for the most part by sea or highlands.

At the outbreak of the World War the country was surpassed in size in Europe by Russia, Austria-Hungary and Germany. With an area of 207,054 square miles, it was less than one-third as large as the Canadian province of Quebec, which to-day is peopled by the descendants of the first French explorers in the New World. The area of the island of Corsica, 3,367 square miles, is included in the above estimate. As the war ended unfavorably for Germany, France asked for the return of its lost provinces—Alsace and Lorraine—and there was no opposition to this proposal among the victorious allies. Accordingly, the peace treaty (May, 1919) declared the two provinces to be again French; stated that Germans who chose to remain there might in three years become French citizens, if they so desired; the railways were given to France, and the public debt was cancelled. This determination added 5,600 square miles to French territory, giving the republic a total area of 212,654 square miles. In addition, France was given possession of the Saar coal region, adjoining Alsace-Lorraine, for fifteen years, under League of Nations control, as compensation for loss of coal mines suffered through German occupation. In January, 1935, the people of the Saar region voted overwhelmingly in favor of a return to German sovereignty, and the region was restored to Germany.

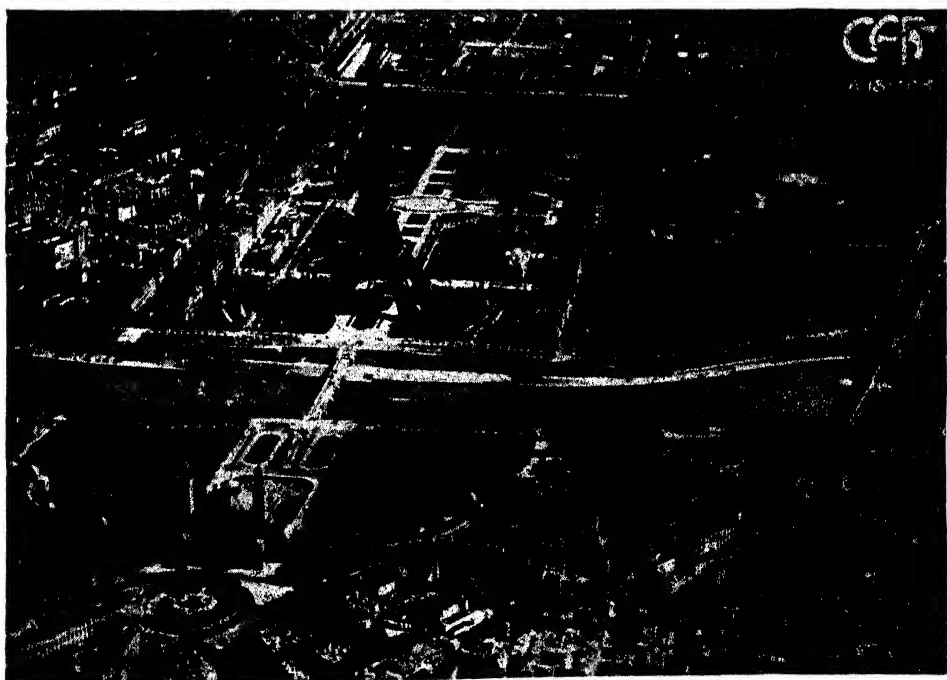
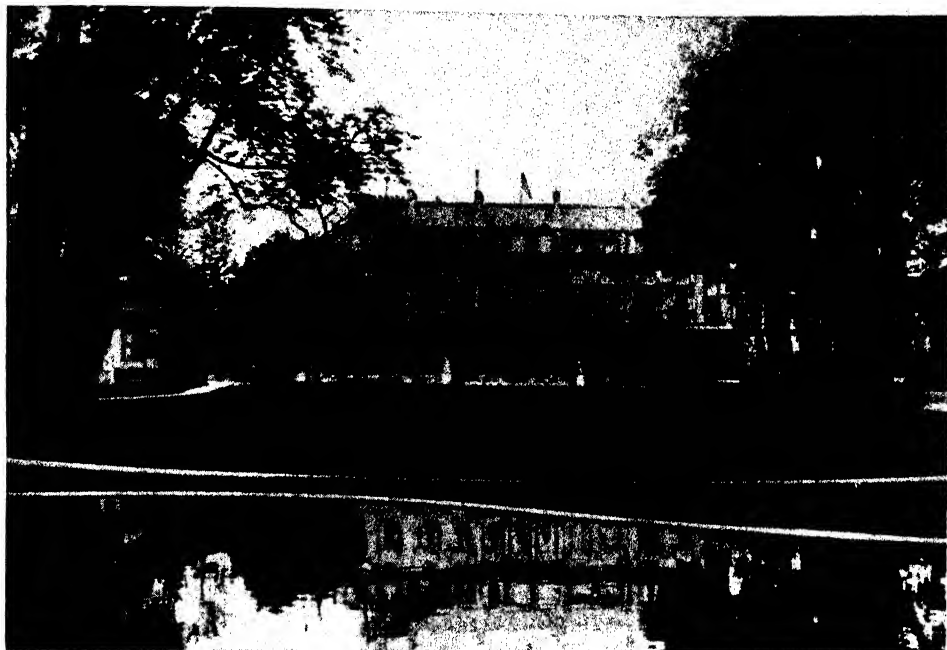
The People. The distinctive characteristics of the French people show the effects of the intermingling of various races. The inhabitants of the northwestern part of France exhibit strong Teutonic characteristics. They are tall of stature and have light hair and light complexion, while those of the

southern and southwestern portion of the country exhibit equally strong Latin traits. They are usually short of stature, have dark hair and eyes and dark skins. There is no marked line of separation between these two classes, since through intermarriage types having characteristics between the two are frequently formed. In the French people as a race there is exhibited the vivacity and quickness of the Southern temperament, and the stability, industry and thrift that are especially associated with Teutonic blood. Their great men are noted for intellectual brilliance and versatility. It is a common thing for their statesmen to be dramatists, novelists and poets, and their great writers to be distinguished in many different fields. Their fondness for laughter and beauty and their zest for life make them lovable and interesting; underneath it all is a strength of character and devotion to duty that is wholly admirable.

The French language prevails throughout the country, but in the north, especially in the departments bordering on Belgium, Flemish is spoken to some extent, while in the southeast Italian is quite common. The place of first rank that France has held in Europe is shown by the fact that for centuries French has been the language of diplomacy on the Continent; all treaties are written in French. See FRENCH LANGUAGE.

At the census of 1911 the population was 39,601,509; according to statistics, during the war the population was decreased four million. At the outbreak of hostilities there were 191.19 persons to the square mile. For a number of years the birthrate in France has been so low as to cause the government serious concern. By the census of 1931, including the restored provinces, the population was 41,834,923.

Education. Public and private education in France is under the direction of the Minister of Instruction, who is assisted by government educational bureaus and inspectors-general. The system of instruction in France is highly organized and centralized. Education is free and compulsory between the ages of five and thirteen, and in all grades the boys and girls meet in separate classes. Secondary education is provided for in state colleges, or lycées, private schools and communal colleges, these latter being supported by the communes (see subhead *Government and Religion*).

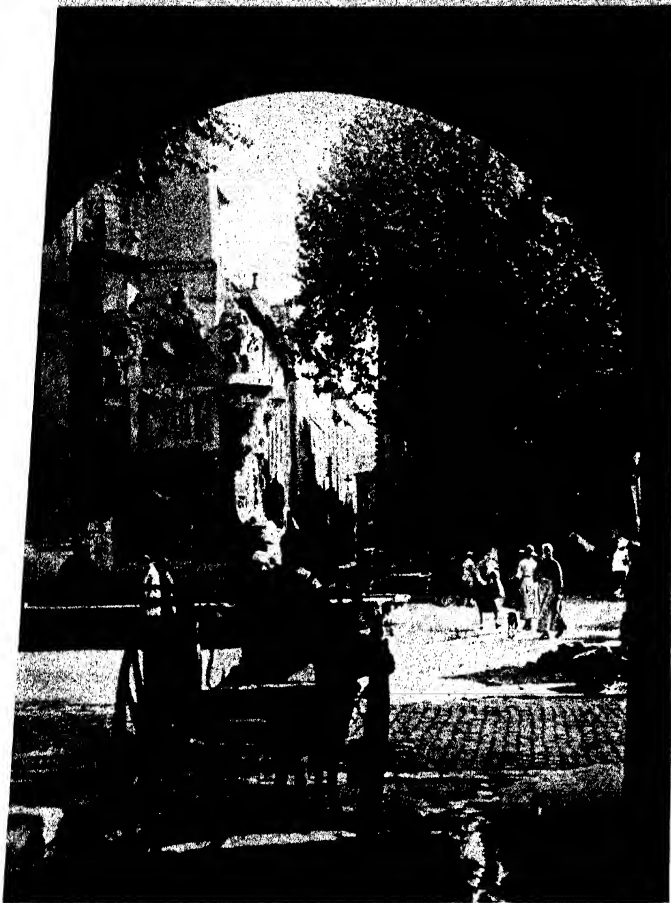


Underwood & Underwood

VIEWS IN PARIS, FRANCE

Above: Palais Elysee, official home of Presidents of France.

Below. Airview of Paris, showing the Eiffel Tower and the Champ de Mars (upper center); Trocadero Palace (razed in 1935) and Gardens (lower left).



PROVINCIAL FRANCE

Left: The picturesque old city of Aix, in Southern France, dates back to a military camp in 122 B.C. Below: Situated in the lovely town of Beaucaire the ruined chapel and Castle of the Counts of Provence is still standing.

Travel Magazine



The majority of the girls who are educated in the higher branches attend convent schools, but the boys usually go to the secular schools, since certificates from these schools are necessary to qualify applicants for certain professional and government positions. For those who desire instruction beyond that provided by the state there are universities, special schools and private instructors. The leading university, that of Paris, has an enrollment of over 25,000 in most years. The entire country is divided into seventeen great administrative districts, each of which has its own officials; each is further subdivided.

Government and Religion. The government is republican in form. The chief executive is a President, elected by the two houses of the national legislature for a term of seven years. He is eligible for reelection. The legislative department consists of the Chamber of Deputies and the Senate. The Chamber comprises members elected by universal suffrage for four years, and a portion among the arrondissements (counties). By law there are 615 deputies. The senate is composed of 314 members, chosen by direct election for nine years. The colonies are represented in the chambers. The President is assisted by a Ministry, the members of which preside over the several departments of government. As in Great Britain, the Ministers are responsible to the national legislature, and go out of office when defeated.

For the purpose of local administration the country is also divided into ninety departments. Each department is governed by a prefect, who is appointed by the President and is assisted by a council composed of a number of members equal to the number of cantons. Each department is subdivided into arrondissements, there being four to a department. The arrondissement is again subdivided into eight cantons, and the cantons are subdivided into communes, the commune being the smallest unit for local government. Each commune comprises a town or a part of a town or one or more villages and is governed by a mayor, who is appointed by the government, and a municipal council, which is elected by the inhabitants. The peculiarity of the French government lies in the direct connection of national government with all local government. Through appointments every officer is practically responsible to the heads of departments, and through them to the President.

The judicial system embraces a series of courts, at the head of which is the Court of Cassation at Paris, consisting of a president, three presidents of sections and forty-five judges, or counselors. Below this are twenty-six courts of appeal, each having jurisdiction over several departments. These courts are engaged entirely with cases appealed from the courts in the arrondissements, known as courts of first instance, and below these are the justice courts of the cantons and communes.

By far the larger part of the inhabitants profess the Roman Catholic faith, and until recently there was a close connection between Church and State, but in 1906 this was completely dissolved. All religious beliefs have equal standing before the government, and all beliefs are tolerated.

Surface and Drainage. The larger part of the country is comparatively low and level. The highest lands are in the south and southeast. The Pyrenees form an unbroken boundary between France and Spain and have an average height of about 9,000 feet, but the highest peaks reach an altitude of nearly 10,500 feet. The eastern boundary of the country is formed by the Alps in the south, the Jura Mountains in the center and the Vosges Mountains in the north. The Alps attain their highest altitudes in this boundary line, where Mont Blanc, which is almost wholly in France, reaches a height of 15,780 feet. Other important peaks on this range are Mont Cenis, to the south, noted for its celebrated pass, and for the railway tunnel which forms connection with Italy; Mont Genevre, and Mont Viso. All of these are of sufficient altitude to give them prominence in a range of mountains noted for the grandeur of its scenery.

West of the Alps and running almost parallel to them are the Cevennes, a range of low mountains which extends almost from the southern to the northern boundary and forms the great watershed separating the valleys of the Rhine and Rhone from the rivers which flow into the Bay of Biscay and the English Channel. In the south-central portion of the country are the mountains of Auvergne, a series of low volcanic peaks, situated upon the central plateau. All of the northern and western portion of the country is a part of the great Asiatic plain, which finds its western terminus here and in the southern part of Great Britain. The general

slope of this plain is to the north and west, and it occupies fully four-fifths of the entire country.

The spurs thrown off by the great watershed divide France into seven principal river basins, six of which are on the northwestern slope and one on the southeastern. These are (1) the basin of the Garonne and its affluents; (2) the basin of the Loire and its tributaries, the Nièvre and Maine on the right, the Allier, Loiret, Cher, Indre, Vienne and Sèvre Nantaise on the left; (3) the basin of the Seine and its tributaries, the Aude, Marne and Oise on the right, the Yonne and Eure on the left; (4) the basin of the Meuse, with its affluent, the Sambre; (5) the basin of the Escaut, or Scheldt, with its affluent, the Scarpe; (6) the basin which pours a number of tributaries, the principal of which is the Moselle, into the Rhine; (7) the basin of the Rhone, occupying the whole of the territory which lies to the southeast of the great watershed, the tributaries being the Ain, Saône, Ardèche and Gard on the right, and the Isère, Drôme and Durance on the left. The four great rivers of France are the Loire, the Seine, the Rhone and the Garonne. France has in all more than 200 navigable streams, with a total navigation of about 5,500 miles. Lakes are few and small.

Climate. The climate of France is characterized by its mild and even temperature throughout all of the lowland region, and by its continental features in the mountainous regions of the interior. In general along the coast the climate is remarkably warm and even for the latitude. This is due largely to the warm winds blowing over the Atlantic, which prevail during the greater part of the year. The high altitudes in the mountainous regions are cooler, and in the Alpine region the climate exhibits a marked contrast between winter and summer. The southeastern section, bordering on the Mediterranean, has a semitropical climate, and here the olive, the orange and other semitropical fruits and plants flourish. The prevailing winds over this portion come from the Mediterranean, and it is due to this fact that this section maintains its high and even temperature. The rainfall varies considerably in different parts of the country. In the mountainous regions of the Pyrenees, the Cevennes and the Alps it usually exceeds forty inches. Throughout the country as a whole the average is about thirty inches. With the excep-

tion of a small area in the northern plains, where the annual rainfall is only about ten inches, there is everywhere an abundance of moisture for agricultural purposes.

Mineral Resources. Exclusive of Alsace and Lorraine, the country has two valuable coal areas—that of Valenciennes, in the northeast, forming the western extremity of the great Belgian coal field, and that of Saint Etienne, in the southeast, to which the manufactures of Lyons and the surrounding districts are indebted for much of their prosperity. The northeastern coal lands were captured early in the war, and they were not recovered until late in 1918. The mines in the vicinity of Lens were wrecked by the Germans and required months of repairing work to become reproductive. Though the annual coal output in normal years is more than 45,000,000 tons, this yield falls so far short of the annual consumption that a large quantity is imported from England and Belgium, particularly the latter, and wood continues to be the common fuel throughout France, at least for domestic purposes. The coal fields contain seams of iron, which are extensively worked and which furnish ore to a great number of blast furnaces; but of the total amount of ore smelted in the country a considerable proportion is imported. Other metals, such as lead, zinc, manganese and copper, are obtained to some extent. Common salt is obtained from mines of rock salt, from salt springs and in still greater quantity from lagoons and salt marshes on the coast. Marble is quarried in the Alps and Pyrenees, granite and other building stone is found in many localities and roofing slate is obtained in large quantities.

Fisheries. The fisheries of France are extensive. The principal fishes of commercial importance are sardines, found on the coast of the Bay of Biscay; herring, mackerel, turbot and salmon, abundant in the English Channel and the North Sea; tunnies and anchovies, found on the shores of the Mediterranean. Oyster breeding is largely engaged in, the most extensive oyster beds being those of the basin of the Arcachon, in the Department of the Gironde. Cod fishing is carried on actively near the Newfoundland banks by French fishermen, and also near Iceland.

Agriculture. About nine-tenths of the soil of France is productive, and about one-half of the whole is under the plow. The cereals forming the great bulk of the cultivated

crops are wheat, oats, rye and barley. Wheat is the most important cereal, and, next to Russia, France raises the largest quantity of all European countries. The crops next in importance to these are meslin, or mixed corn, potatoes, hemp, rape, maize, buckwheat, flax and beets. Beets are cultivated extensively in some departments, especially in that of Nord, for the manufacture of sugar. The cultivation of tobacco is monopolized by the government and is confined to certain departments. In France grass land is not abundant and the breeding of cattle is indifferently practiced. The rearing of sheep is more successful, much of the wool being scarcely inferior to merino wool. Excellent horses are bred in the north, and as there is an extensive demand for horses for the army, considerable pains is taken in the government studs to improve the breeds. Asses and mules, generally of a superior description, are much employed.

The cultivation of the vine is one of the most important branches of French agriculture, the total quantity of land in vineyards being nearly a twenty-fifth of the whole surface. In everything relating to this branch of culture, the French are unsurpassed, the various first-class wines which they produce, under the names of Champagne, Burgundy and Bordeaux, being universally known. It is estimated that in good years France produces about one-half of the wine of the world. Among the most important fruit trees cultivated in France are the apple, especially in Normandy; the chestnut, whose nuts in some of the central districts of France form a staple of food among the poorer classes; the mulberry tree, cultivated in the southeast, both for its fruit and its leaves, the latter furnishing the food of the silkworms so largely reared here (see *SILK*); the olive, the pear, the plum, the peach, the orange, the citron and the fig. The land is divided into small farms, the largest seldom exceeding fifteen acres. Most of these farms are owned by those who occupy them. Intensive farming is practiced; the utmost skill and latest scientific methods are employed in cultivating the soil, and excellent returns reward the husbandmen.

Manufactures. In those lines of manufacture which require skill and good taste, France has a reputation which is world-wide. From no other country do there come such beautifully made gloves, laces, gauze, small

pieces of jewelry, silks, tapestries and china and glass ware. The textile manufactures are the most important line, and include woolen, cotton and silk goods, ranking in the order named. The center of the silk industry is Lyons, which is far south of the war zone. In normal years the textile output is valued at about \$600,000,000, and though the mills were greatly demoralized by the war, there followed a gradual recovery; to-day more spindles are employed than ever before in French history. The metal industries, which rank second to textiles in normal times, were stimulated by the demands of the war, and showed a great increase. The smaller metal products of the French factories are noted both for excellence of construction and artistic finish. Though France does not manufacture machinery on the same scale as the United States, its automobiles, airplanes, and field artillery guns are among the finest made anywhere. Flour, macaroni and sugar are other important lines of manufacture. French wines set a standard of excellence for the world.

Transportation and Commerce. France has an extensive and well-managed system of railways. Of the total mileage of about 26,115, over one-fourth is owned by the state, and all other roads are under government regulation. In course of time all of these railways will be government-owned. The railway systems radiate from Paris and can be worked as a unit by means of the *Grand Ceinture*, a strategic railway encircling the capital. France leads all Europe in military aircraft; aviation is considered its first line of defense. Commercial airplanes cover the country, and reach on regular routes many of its colonial outposts.

France has over 7,000 miles of navigable waterway, made up of rivers and canals. These are of great service in relieving congestion on the railroads. Even during the war plans were made to extend the canal system (see *CANAL*).

In normal years France has an annual foreign trade of more than 46 billion francs, the import trade constituting over half. Manufactured products are exported in great quantities, and there are large imports of raw materials.

Literature and Art. See *LITERATURE*, subhead *French Literature*; *PAINTING*; *SCULPTURE*, subhead *France*; *ARCHITECTURE*.

Colonies. The colonial possessions of

France far exceed in area and population the home country and are distributed as shown by the following table:

FRANCE'S COLONIAL POSSESSIONS	AREA, Sq. MILES	EST. POP.
IN ASIA		
India.....	196	286,410
Annam.....	39,758	5,119,801
Cambodia.....	67,550	2,806,000
Cochin-China.....	26,476	4,467,352
Tonking.....	40,530	8,012,429
Laos.....	82,604	944,000
Syria (Mandate)*.....	60,000	2,831,622
IN AFRICA		
Algeria.....	847,560	6,553,451
Tunis.....	48,300	2,410,692
Senegal.....	74,112	1,584,273
French Sudan.....	561,303	2,853,665
Upper Volta.....	113,185	3,000,243
Guinea.....	96,852	2,236,968
Ivory Coast.....	121,590	1,866,316
Dahomey.....	41,302	1,112,000
Mauritania.....	322,235	323,819
Niger.....	463,200	1,542,714
Equatorial Africa.....	912,000	3,192,282
Cameroon (Mandate).....	166,489	1,878,683
Togo (Mandate).....	21,893	750,065
Reunion.....	970	197,933
Madagascar.....	241,094	3,701,770
Mayotte.....	790	130,250
Somali Coast.....	5,790	68,965
IN AMERICA		
St. Pierre and Miquelon.....	93	3,584
Guadeloupe.....	688	267,400
Martinique.....	385	234,700
Guiana.....	34,740	22,100
IN OCEANIA		
New Caledonia, etc.....	8,548	57,165
Tahiti, etc.....	1,520	35,900
Total.....	3,958,626	58,492,552

* To be released.

Army and Navy. See **ARMY**, subhead *French Army*; **NAVY**, subhead *French Navy*.

Cities. France has a number of important cities. At the head of these stands Paris, the political and commercial capital of the country and the second city on the Continent. The other large cities, in the order of their importance, are Marseilles, Lyons, Bordeaux, Lille, Toulouse, Saint-Etienne, Roubaix, Nantes and Havre. In this comparatively small country there are 17 cities each with a population exceeding 100,000, and 40 between 50,000 and 100,000.

History. France, or Gaul, as it was called by the Romans, was inhabited during the earliest years in which we have any knowledge of it by a number of independent tribes, who appear to have been mainly Celtic in race. In the latter half of the seventh century B. C., the Romans conquered a portion of the southeast, and under Julius Caesar the conquest of all Gaul was completed, between 58 and 51 B. C. During the Roman

occupation, the country became completely Romanized in language, civilization and religion, and many flourishing towns sprang up; but in the decline of the Roman Empire various German tribes began to make settlements in the country, especially the Visigoths, the Burgundians and the Franks. It is from these last that the country took its name. Toward the close of the fifth century, Clovis, chief of the Salian Franks, completely overthrew Roman dominion and made himself master, not only of almost all France, but of considerable territory east of the Rhine. The dynasty which he founded is known as the Merovingian.

On the death of Clovis, in 511, his kingdom was divided among his four sons, and a large part of the history of the Franks under the Merovingian kings is the history of the contests between Neustria and Austrasia, the two most important of the states into which the Empire was divided. Pippin of Heristal, mayor of the palace of the Austrasian king, conquered Neustria and thus brought all France under the same sway. He was the real ruler, although there was still a nominal king, as there was during the time of Pippin's son, Charles Martel. Pippin the short, first mayor of the palace under the last of the Merovingian kings, was himself raised to the throne in 751. He was succeeded in his kingdom by his son, Charles the Great. Charlemagne's great empire was a German one, however, and there was as yet, strictly speaking, no kingdom of France.

On the death of Charlemagne's son, Louis the Pious, the empire was divided by the Treaty of Verdun (843) among his sons, Charles the Bald receiving that part which most nearly corresponds to modern France. It is at this time, therefore that the separate history of France may be said to begin.

Charles the Fat, King of Germany, succeeded in 884 in making himself ruler of the Frankish territory also, but he was deposed after three years. After the brief usurpation of Odo, count of Paris, Charles III, the brother of Louis III, was recognized as king. His authority was little more than nominal, as France was divided into a number of great fiefs, the holders of which were practically independent. This circumstance made it impossible for Charles to offer any adequate resistance to the Norman pirates, whom he was obliged to buy off by surrendering to them the territory which took from them the

FRANCE

DURING THE MIDDLE AGES

Louis IX
 Philip the Fair
 Hundred Years War
 Poitiers
 Peace of Brétigny
 Battle of Orléans
 Joan of Arc
 Joan of Arc
 End of the Middle Ages

1270
 1294
 1337
 1356
 1419
 1429
 1453
 1485



name of Normandy. On the death of Louis V, in 987, Hugh Capet, the son of the most powerful of the great vassals, was raised to the throne, thus becoming the founder of the Capetian dynasty. The fact that the accession of the House of Capet added to the Crown the great fiefs of Paris and Orleans made the central authority somewhat stronger than it had been under the Carolingian kings.

The first great task of the Capetian line was to reconquer the royal prerogatives from the great vassals, but for two centuries they were unsuccessful. Louis the Fat, who came to the throne in 1108, was the first really strong ruler of the line. In his struggles with the nobles he was greatly helped by the fact that the latter had been much weakened by the Crusades and also by the increased power of the towns, who allied themselves with the king.

With the death of Charles IV, in 1328, the first branch of the Capetian kings became extinct, and Philip, of the House of Valois, a cousin of Charles IV, came to the throne, according to the Salic Law. The claim of Edward III of England to the throne of France led to a series of wars between the two countries, which lasted for over one hundred years. Under Charles VII, France regained from England all of the territory of France, except Calais. The shrewdness and unscrupulousness of Louis XI (1461-1483) completed the subjugation of the great barons and laid the foundation of absolute monarchy. Maine, Anjou and Provence were left to him by the will of the last count, and a large part of the possessions of the duke of Burgundy came to his hands shortly after the death of Charles the Bold of Burgundy. Louis's son and successor, Charles VIII (1483-1498), united Brittany to the Crown by his marriage with Anne of Brittany. During the reign of Charles VIII occurred the first invasion of Italy by France, which had such important results.

Charles was the last king of the direct line of Valois and was succeeded by Louis XII, of the House of Valois-Orleans. On his death the crown passed to another branch of the House of Valois, the Valois-Angoulême branch, in the person of Francis I (1515-1547). Francis continued the attempts at conquest in Italy and thus came into conflict with Charles V of Germany, who claimed Milan. The results were disastrous

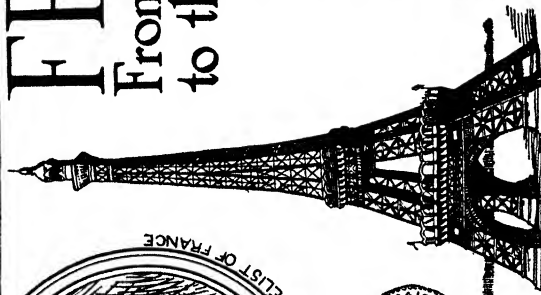
for Francis. On the death of Francis, his son, Henry II (1547-1559), came to the throne, and he continued the struggle with Austria. His reign is noteworthy, because during it began the persecution of the Huguenots. Francis II, the husband of Mary Queen of Scots, succeeded his father, Henry, but reigned little more than a year (1559-1560). During his reign and the reigns of his brothers, Charles IX and Henry III, intrigue and corruption gave to women a dangerous influence at court and in public affairs. During the reign of Charles IX, who was entirely under the influence of his mother, Catharine de' Medici, the struggle between Huguenots and Catholics came to a climax in the Massacre of Saint Bartholomew's Day. These religious wars were terminated only when Henry IV of Navarre (1589-1610), the leader of the Huguenots, who became king of France on the death of Henry III, went over to the Catholic Church.

During the minority of Henry's son, Louis XIII, the policy of France was somewhat wavering, until the prime minister, Richelieu, gave it a steady direction. He continued the policy of the former kings who had labored for the humiliation of Austria and relentlessly oppressed the Huguenots. Louis XIII died in 1643, the year after Richelieu, and was succeeded by his son, Louis XIV. Mazarin, during the years of Louis's minority, carried out the policy of Richelieu, and Louis XIV, when he took the rule into his own hands, proved to be a ruler of strong will and steady purpose. The close of this reign in 1715 found the finances in disorder, an enormous national debt imposed upon the country and industries in a depressed condition. Louis XV, the great-grandson of Louis XIV, succeeded him at the age of five years. During his minority, the regent, the Duke of Orleans, squandered the revenues in a most reckless manner, and when Louis himself assumed the authority matters grew worse, rather than better, for he was constantly under the influence of mistresses, by whom he was led into useless and costly wars.

With the reign of Louis XVI began the period of reaction against the oppression which had been practised on the people. The king himself was honest and well-meaning, but the whole administration was corrupt, and the court, the nobility and the clergy formed a privileged class, united to oppress the people. The taxation, which was neces-

FRANCE

From the Consulate to the World War



EIFFEL TOWER. HEIGHT, 984 FEET



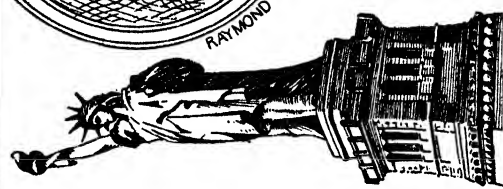
VICTOR HUGO, GREATEST NOVELIST OF FRANCE



COIN OF YEAR XIII 1803-4



NAPOLEON BONAPARTE



"LIBERTY ENLIGHTENING THE WORLD," A Gift from the French Republic to the Greatest Republic. Height of Statue, 151 feet; of pedestal, 135 feet.



NAPOLEON III
LAST OF THE
EMPERORS



RAYMOND POINCARÉ, PRESIDENT

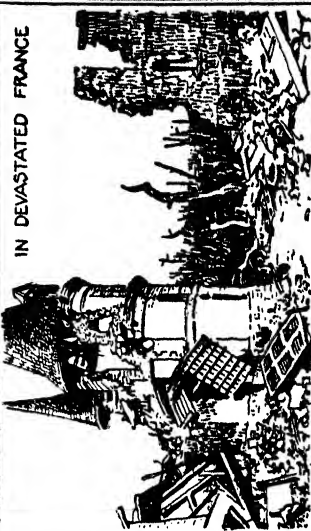
NAPOLEON'S EMPIRE AT ITS GREATEST EXTENT



Chronological Summary

Napoleon, First Consul.....	1799
Napoleon Crowned Emperor.....	1804
Waterloo.....	1815
Restoration of Louis XVIII.....	1815
Death of Napoleon I.....	1821
Revolution of July.....	1830
The Second Republic.....	1848
Criméan War.....	1854
Franco-German War.....	1870
Third Republic.....	1870
Universal Exposition, Paris.....	1900
World War began.....	1914

IN DEVASTATED FRANCE



sarily heavy, fell upon the peasantry only, leaving the two leisure classes untouched. The good intentions of Louis were neutralized by a total lack of energy and firmness, and he was unable to appreciate the fact that his few concessions could not materially improve a situation which called for the most thorough-going reforms. The great difficulty of his government was the hopeless condition of the public finances, with which Turgot, Necker, Calonne and Brienne in vain attempted to grapple. Finding all ordinary measures unavailing, Necker called for the congregation of the States-General, which had not met since 1614. This body met in May, 1789. In 1799 Napoleon was made first consul, and for the next sixteen years he dominated the history of France.

Louis XVIII, who was placed on the throne of France on Napoleon's first abdication in 1814 and was restored in 1815 after the Hundred Days, at first governed with the support of a moderate liberal party. The reactionary spirit of the aristocrats and returned *émigrés* soon, however, came to predominate. Louis died in 1824 and his brother Charles succeeded him. The oppressive policies of the former reign were still more prominent under the new ruler, and finally, in 1830, the ministry published ordinances suppressing the liberty of the press and creating a new system of elections. The result was the insurrection of July, 1830, by which Charles X was overthrown and Louis Philippe, Duke of Orleans, was proclaimed king. The new administration proved popular with no party, and in February, 1848, another revolution drove Louis Philippe into exile. A republic was proclaimed, and in December, 1848, Louis Napoleon, nephew of the great Napoleon, was elected President for four years. Three years later he established himself as President for a further term of ten years, and in 1852 he was able to have himself declared emperor, as Napoleon III.

In 1870 the uneasiness of Napoleon and the French at the steady growth of Prussian power reached a climax when the Spanish crown was offered to a prince of the House of Hohenzollern. The result of this episode was the Franco-German War, which ended in the complete defeat of the French and the capture of Paris in 1871. The Third Republic was proclaimed, though the present Constitution was not adopted until 1875. Louis Thiers held the office of President from 1871 to 1873,

and Marshal MacMahon from 1873 to 1879. Subsequent Presidents were Jules Grévy (1879-1887), Sadi Carnot (assassinated in 1894), Casimir-Périer (1894-1895), Félix Faure (1895-1899), Emile Loubet (1899-1906), Clement Fallières (1906-1913), Raymond Poincaré (1913-1920), Paul Deschanel (1920), Alexandre Millerand (1920-1924), Gaston Doumergue (1924-1931), Paul Doumer (assassinated in 1932) and Albert Lebrun (1932-). During Carnot's administration an unsuccessful attempt to restore the monarchy was made by General Georges Boulanger, and there were other political disturbances, but it was a united nation that rallied its forces in the World War.

After the war, France began the task of reconstructing its devastated regions. A period of prosperity gave way to a financial depression, and in 1926 the franc dropped to an exchange value of less than three cents. Under the leadership of Premier Poincaré, who was also Minister of Finance, the budget was balanced and the gold standard restored in 1928, with the franc stabilized at \$0.0392. Another crisis developed after Great Britain abandoned the gold standard and the United States devalued the gold dollar, for the franc became so dear in terms of foreign currencies that trade dwindled and unemployment increased. In January, 1936, after a succession of short-lived Cabinets, Leon Blum became Premier. He was returned to office in the spring elections, which were won overwhelmingly by a coalition of left-wing groups, the so-called Popular Front. Under agreement with the British and American governments, the gold content of the franc was reduced, resulting in an exchange value of about 4.3 + cents to 5 cents. Laws of an advanced nature were passed, including provisions for a forty-hour week and collective bargaining.

Related Articles. Consult the following titles for additional information:

CITIES AND TOWNS

Amiens	Limoges	Roubaix
Avignon	Lyons	Rouen
Bordeaux	Marseilles	Saint Etienne
Brest	Metz	Saint Quentin
Calais	Nancy	Strassburg
Cherbourg	Nantes	Toulon
Crécy	Nice	Toulouse
Dunkirk	Nîmes	Tours
Fontainebleau	Orleans	Verdun
Havre	Paris	Versailles
Lille	Rheims	

COAST WATERS; RIVERS

Aisne	Mediterranean Sea
Atlantic Ocean	Meuse
Biscay, Bay of	Moselle
English Channel	Rhone
Garonne	Saône
Loire	Seine
Marne	Somme

MOUNTAINS	
Alps	Mont Blanc
Cevennes	Pyrenees
Jura	Vosges
HISTORY	
Aix-la-Chapelle,	Hundred Years' War
Congress of	Jacobins
Aix-la-Chapelle,	July Revolution
Treaties of	Legion of Honor
Albigenses	Lepzig, Battles of
Alsace-Lorraine	Liberty Cap
Bastille	Louisburg, Sieges of
Bonaparte	Merovingians
Bourbon	Mississippi Scheme
Brittany	Nantes, Edict of
Burgundy	Normandy
Capetian Dynasty	Normans
Carolingians	Orleans
Chivalry	Panama Canal
Commune of Paris	Paris, Treaties of
Continental System	Parlement
Crécy	Powers, The Great
Crimean War	Quebec, Battle of
Croix de Guerre	Reformation
Crusades	Renaissance
Directory	Saint Bartholomew's
Emigrés	Day, Massacre of
Feudal System	Salic Law
Field of Cloth	Sedan, Battle of
of Gold	States-General
Franco-German War	Succession Wars
French and Indian	Trafalgar
War	Triple Alliance
French Revolution	Triple Entente
Fronde	Valois
Gascony	Vienna, Congress of
Gaul	Waldenses
Girondists	Waterloo, Battle of
Guise	World War
Huguenots	X. Y. Z. Correspondence

BIOGRAPHY

Barras, Count de	Loubet, Emile
Bayard, Chevalier de	Louis I
Carnot, Marie Francois	Louis IX
Catharine de Medici	Louis XI
Charlemagne	Louis XII
Charles VI	Louis XIII
Charles VII	Louis XIV
Charles IX	Louis XV
Charles X	Louis XVI
Charles Martel	Louis XVII
Charles the Bold	Louis XVIII
Clemenceau, Georges	Louis, The German
Clovis	Louis Philippe
Danton, Georges	MacMahon, Marie E.
Jacques	Marat, Jean Paul
Delcassé, Theophile	Mazarin, Jules
Dreyfus, Alfred	Mirabeau, Count de
Faillières, Clement	Montcalm, de Saint-
Armand	Veran, Marquis de
Foch, Ferdinand	Murat, Joachim
France, Anatole	Napoleon I
Frontenac, Comte de	Necker, Jacques
Gambetta, Leon	Ney, Michel
Genet, Edmon Charles	Poincaré, Raymond
Edouard	Pétain, Henri
Godfrey de Bullion	Richelieu, Duke de
Grevy, Jules	Robespierre, Maximilien
Guizot, Francois	Rochambeau, Count de
Henry III	Rodin, Auguste
Henry IV	Talleyrand-Perigord,
Joan of Arc	Duke de
Joffre, Joseph Jacques	Thiers, Louis Adolphe
Lafayette, Marquis de	

UNCLASSIFIED

Champs Elysees	Oriflamme
Cluny Lace	Sèvres Porcelain

FRANCHISE, *fran'chize*, in a general and legal sense, a particular privilege or right, granted by a government to an individual, association or corporation; as, a *franchise* to construct and operate street railways, to erect a lighting plant, to lay gas mains, to

install wires for electric light, or to provide a city with water. The name is especially given to the right to vote.

FRANCIS I (1708-1765), Holy Roman emperor. In 1736 he married Maria Theresa, daughter of the emperor Charles VI, and after the death of Charles VI (1740) he was declared by his wife co-regent of all the hereditary states of Austria, but without being permitted to take any part in the administration. He became emperor in 1745.

FRANCIS II (1768-1835), Holy Roman emperor and emperor of Austria, succeeded his father in 1792. France declared war against him in 1792, and hostilities continued till the Peace of Campo Formio in 1797. In 1799 he entered into a new coalition with England and Russia against the French republic, but the result of the Battles of Marengo and Hohenlinden was far from favorable to Austria. In 1804 Francis assumed the title of hereditary emperor of Austria, and in the following year, after the Battle of Austerlitz, he was forced to give up his title of Holy Roman emperor. In 1809 he again took up arms against France, and in the Peace of Vienna was compelled to surrender much territory. After the overthrow of Napoleon, Francis became a member of the reactionary Holy Alliance, under the guidance of his minister, Metternich.

FRANCISCANS, the members of the religious order established by Saint Francis of Assisi about 1210. They are also called Minorites, or Friars Minor, which was the name given them by their founder in token of humility, and sometimes Gray Friars, from the color of their garment. The Order is distinguished by vows of absolute poverty and a renunciation of the pleasures of the world. The Franciscans have been notably identified with missionary work in the United States and Canada.

FRANCIS JOSEPH I (1830-1916), emperor of Austria and king of Hungary, and next to the last of the Hapsburg rulers. He was the eldest son of Archduke Francis and a nephew of Ferdinand I, whom he succeeded as ruler of the old Austrian monarchy in 1848. Ascending the throne at the age of eighteen, he passed a life crowded with personal sorrow, fated to witness the diverse and antagonistic peoples of his realm grow more and more restive from year to year. After a rule of sixty-eight years, he died in the midst of the great war which he had

helped to bring about. Shortly after Francis Joseph ascended the Austrian throne, the Hungarians, under the leadership of Louis Kossuth, revolted and proclaimed Hungary an independent republic. At first the armies of the emperor were everywhere defeated, and he was not able to overcome the stubborn resistance of the Hungarians until he received military aid from Czar Nicholas of Russia (1849).

For the next four years the emperor was almost completely dominated by his ministers, but in 1852 the personal rule of the emperor really began. Except on rare occasions Francis Joseph was thereafter the real ruler of his empire. He not only appointed ministers but controlled their policy. Owing to his great knowledge of affairs and his unending diligence and capacity for work, he had a real control even over the details of government. Early in his reign his policy was conservative—almost reactionary—but in later years he showed a broader view of affairs and a willingness to grant necessary reforms. After the disastrous war with France and Sardinia in 1859 and the Seven Weeks' War with Prussia in 1866, Francis Joseph saw the need of liberal action, and in 1867 the relations of Austria and Hungary were adjusted by the grant of a constitution to Hungary. This year marks the establishment of the dual monarchy of Austria-Hungary, in which Francis Joseph ruled as emperor of Austria and king of Hungary.

In private life the emperor was the victim of many catastrophes—his wife, his brother, his only son and his nephew having met violent deaths. His brother, Emperor Maximilian of Mexico, was shot in 1867. His son, Crown Prince Rudolph, committed suicide in 1889, and his wife, the Empress Elizabeth, was killed in Geneva, Switzerland, by an Italian anarchist in 1898. The last of these catastrophes was the assassination of the Archduke Franz Ferdinand, nephew of Francis Joseph and heir to the throne. The causes of this last tragedy and its terrible results are explained in the article **WORLD WAR**. When Francis Joseph died (1916) his nephew Charles succeeded him, but ruled only two years. In 1918, toward the close of the World War, Austria-Hungary broke up into various separate nations, and Charles was forced to abdicate. For other details, see **AUSTRIA-HUNGARY**, and titles listed at the end of that article.

FRANCIS OF ASSISI, SAINT (1182-1226), an Italian monk, founder of the religious Order of Franciscans, and one of the greatest names in the history of the Roman Catholic Church, was born in Assisi, Umbria province, Italy. His father was Pietro di Bernardino, and the son was named Giovanni, the English equivalent being John. The father frequently traveled in France, and because of this the son was soon called Francesco (Francis in English). As was customary, the youth served in the army, and spent a year as a military prisoner. Upon his release, he intended to join another army, but illness sent him home; this incident proved the turning point in his life. He forsook worldly ways, put behind him ease and comfort, gave himself to ascetic living and to preaching. Gathering a small group about him, a visit was made to the Pope (1206), who gave them permission to live in the manner Francesco had chosen, that of giving up all earthly possessions and living by alms. This was the beginning of the Franciscan Order. While this is the name by which the order is best known, it is also called Minorities, or Friars Minor, in various parts of the world.

His followers were sworn to poverty, chastity, and obedience. They were sent out as missionaries, and the number of friars increased rapidly. Francesco became known as the revered Francis of Assisi. From Italy the Order extended its influence to Spain, France, the Holy Land, and eventually to all Western Europe and across the seas. Today there are about 17,000 friars in the Order, and 10,600 nuns in the Poor Clares. Two years after the death of Francis, he was canonized. His example has inspired men and women in all the seven hundred years since his time.

FRANCO-GERMAN WAR, a short struggle (1870-1871) between France and Germany which might have been averted had it not been for the scheming of the Prussian Prince Bismarck. However, two important considerations contributed to bring on the conflict. France, an empire, was jealous and fearful of the growing power of Prussia; the emperor, Napoleon III, realized that his throne was insecure, and he believed a victorious war would strengthen his position. Bismarck was working for a united and strengthened Germany, and he believed in war as an agent to achieve that end. Austria

had been humbled (see *SEVEN WEEKS' WAR*); Prussian influence was paramount in that country, and it controlled all Germany, and Bismarck determined it should be felt throughout the continent.

The immediate cause of the Franco-German War, however, was the offer of the crown of Spain to Leopold of Hohenzollern, a prince of the reigning house of Prussia. Napoleon III demanded of the king of Prussia that he should forbid Leopold to accept the candidacy, and when the prince voluntarily retired, Napoleon still insisted that the renunciation should be made formally by the king and that a guarantee should be given that the refusal was final. Prussia of course refused this demand. Bismarck was ordered to make public the demand of France, and he did so, but not fully, for he published only such parts as would anger the Germans. The result was a declaration of war by France.

In Prussia the certainty of war had long been foreseen, and the country was well prepared. In France, however, conditions were much less favorable, and Napoleon III was completely deceived as to the resources which were at his command. At the outset of the struggle the French had an army only about half as large as the Prussian, while back of the latter was a reserve force larger than the entire army of France. From the first France met with defeats. At Weissenburg and at Wörth the Germans were victorious; they separated the two divisions of the French army under MacMahon and Bazaine and prevented their junction. MacMahon, in September, 1870, was surrounded at Sedan and compelled to surrender both army and fortress. Among the prisoners was Napoleon III. Meanwhile, Bazaine had been shut up in Metz, and in October of the same year he, too, was forced to surrender.

One of the first consequences in France of the defeat at Sedan was the deposition of Napoleon and the proclamation of the third republic. Immediate preparations were made in Paris to withstand a siege, but the utmost efforts of the French could not relieve the city, and in February, 1871, it was forced to yield. By the terms of the treaty, which was signed in May of the same year, France was obliged to give up Alsace and a part of Lorraine and pay a war indemnity of about \$1,000,000,000; and it was provided that a German army should hold

certain departments of France until the entire indemnity was paid.

The Germans thought the enormous indemnity could not be paid in a generation, and that France would be at the Prussians' mercy for many years; but the new republic astonished the world by paying the full amount in three years and thus early ridding the country of the last of the German army of occupation. The humiliation of the period was never forgotten by the French.

The seizure of Alsace-Lorraine (which see) was bitterly resented by the French, and its recovery was one of the objects for which France fought in the World War (1914-1919). See *FRANCE*, subhead *Location and Size*; *WORLD WAR*.

FRANCOLIN, *frang'koh lin*, a genus of birds related to the partridges, found in Asia and Africa. There are more than forty species, most of which are considered good game birds. The commonest, the *redwing*, of South Africa, is hunted by English colonists. The birds are very rapid on their feet, and fly heavily, with a whirring noise. They feed in the evening and morning, intermittently making a loud, shrill cry that sounds somewhat like laughter.

FRANKFORT, IND., founded in 1830, is the county seat of Clinton County, forty-five miles northwest of Indianapolis, on the New York, Chicago, & Saint Louis, the Pennsylvania, and the Chicago, Indianapolis & Louisville (the Monon). The city is in an agricultural district, and has manufactures of kitchen cabinets, porcelain signs, flour, lumber, bricks, machinery, children's clothing, bathroom fixtures, implements and other articles. The New York, Chicago, & Saint Louis Railroad has repair shops here. There is a Carnegie Library, a hospital, and a courthouse. Population in 1920, 11,585; in 1930, 12,196, a gain of about 5 per cent.

FRANKFORT, KY., founded in 1786, the capital of the state since 1792 and the county seat of Franklin County, is fifty-five miles east of Louisville, on the Chesapeake & Ohio, the Louisville & Nashville and the Frankfort & Cincinnati railroads, and on the Kentucky River, in the heart of the Blue-grass region. The stream furnishes water power for a great variety of manufactures. On a hill near the city is Franklin Cemetery, which is considered one of the most beautiful in the South; here Daniel Boone and Vice-President Johnson are buried.

The prominent buildings include the governor's mansion, one of America's handsomest state capitols, a Y. M. C. A. building, an arsenal, a penitentiary, a home for feeble-minded children and a state normal school for colored students. The old state capitol houses the state historical society. The industries include the manufacture of cement, shoes, chairs, twine and brooms, and there are large tobacco warehouses. The city has long been an important distilling and whisky center. Frankfort was founded by General James Wilkinson in 1786, and it became the capital when the state was admitted to the Union. Population, 1920, 9,805; in 1930, 11,626, a gain of 18.5 per cent.

FRANKFORT - ON - THE - MAIN, GERMANY, an important railroad and banking center of Prussia, situated in the province of Hesse-Nassau, twenty miles northeast of Mayence (Mainz). The city has many fine residences and public buildings. It lies chiefly on the right bank of the River Main, and by way of this stream and the Rhine has direct connection with the ocean. It is also the junction point of at least seven railways. The most remarkable of the churches is the Dom, or Cathedral, of Saint Bartholomew. Other buildings are the new opera house, one of the finest buildings of the kind; the courts of justice, of modern construction; the new exchange, a spacious and handsome edifice; the large palace of the Prince of Thurn and Taxis; one of the finest railway stations in the world; the archive building; the post-office; the house in which Luther dwelt, and that in which Goethe was born. Frankfort is rich in collections connected with literature and art and in establishments to promote them. The chief of these are the Historical Museum, the Stadel Art Institute and the Rothschild Library.

The manufactures comprise chemicals, ornamental articles of metal, sewing machines, straw hats, soap, perfumery and beer. A great business is done in money and banking, for the city is one of the chief financial centers of Europe.

Frankfort dates from the time of Charlemagne. In the thirteenth century it became a free city and for a long time after this was the place of the election of the German emperors. It was a prosperous and powerful city up to the time of the wars of the French Revolution, when it declined. On Napoleon's downfall, Frankfort became a free city, and

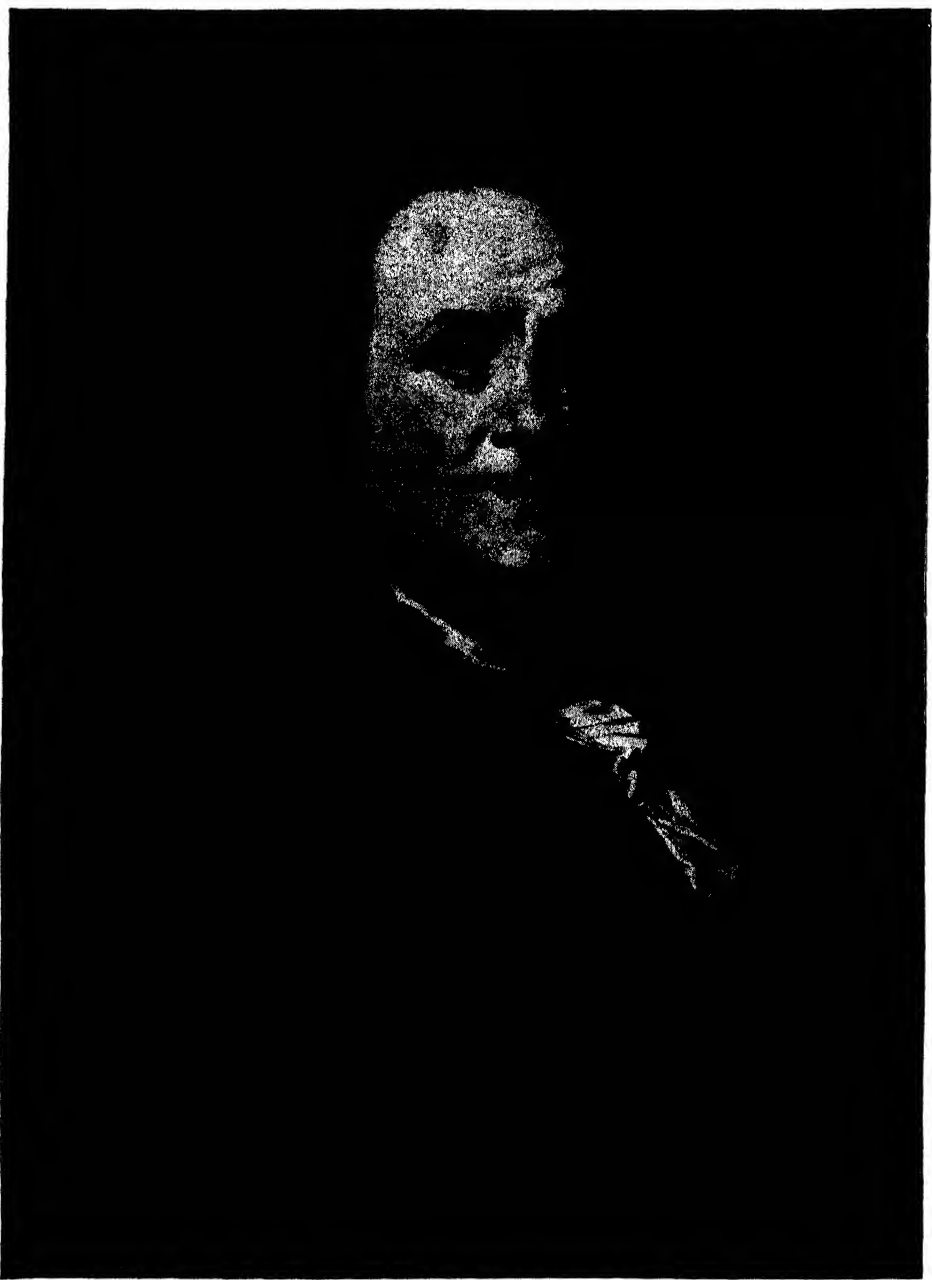
by the Congress of Vienna (1815) it was made the seat of the German diet. In 1866 it was incorporated with Prussia. The history of the city since that date has been marked by steady growth. Population, 1933, 555,071.

FRANK'ING, the privilege of sending letters and packages through the mail without charge. The right was abolished by Parliament in Great Britain in 1840. In the United States it was first granted to Revolutionary soldiers, then to various officers of the government and to senators and representatives in Congress. It was abolished in 1873, but was later restored. It is now possible for all officers of the government to send public documents through the mail without charge. Seeds and agricultural reports are also sent free of charge. The privilege, it is charged, is abused by Congressmen, who take advantage of the system to mail their speeches to millions of constituents. The franking privilege is usually extended to the widows of former Presidents.

FRANKLAND, or **FRANKLIN**, a name given in 1784 to a state organization by inhabitants of what is now a part of Tennessee, then a part of North Carolina. It was formed as a protest against the action of North Carolina in depriving the citizens in this region of state government. At the close of the Revolutionary War Congress had no money to pay debts, and asked all the states holding Western lands to donate them to the Federal government. North Carolina agreed, but the settlers disapproved and set up a new state which they named Frankland, or Franklin. A constitution was framed and ratified, and a legislature and a governor, John Sevier, were elected. After a bitter struggle the new government was suppressed by North Carolina in 1788. In 1790 the territory of Tennessee was ceded to the United States government, and thus the disturbance was quieted. See *TENNESSEE*, subhead *History*.

FRANKLIN, a former district of Canada, now a part of the North West Territories, named for Sir John Franklin. It was composed of all the islands north of the mainland. The area was estimated at 500,000 square miles. See *NORTH WEST TERRITORIES*.

FRANKLIN, BATTLE OF, a battle of the Civil War in America, fought November 30, 1864, at Franklin, Tenn., between a Federal force of about 25,000 under General Schofield and a Confederate force of about 40,000 under



BENJAMIN FRANKLIN

One of the most useful citizens and public men his country has ever had. He almost always got what he went after, and he got much for his country in the days when it was in great need. Of him it might be said that he was "as wise as a serpent and harmless as a dove." Through his life and his writings he has influenced a host of people to be better Americans.

General Hood. It was the result of Hood's plan to draw Sherman from his advance to the sea by taking a large Confederate force into Tennessee and Kentucky and threatening the North Central states. Thomas had been detached from Sherman's army and sent north to Nashville. Schofield was also given a considerable force, with instructions to delay Hood's advance northward as long as possible. The Confederates gradually forced Schofield to retreat toward Nashville, but the Federals made a stand at Franklin, on the south side of the Harpeth River. At first, through a misunderstanding of orders, the Federals were thrown into great confusion, but after a long struggle the Confederates were compelled to withdraw from the attack, and Schofield withdrew toward Nashville.



FRANKLIN, BENJAMIN (1706–1790), an American indispensable to the age in which he lived—printer, publisher, author, scientist, philosopher, wit, colonial Legislator, postmaster-general, commonwealth builder, colonial agent to England, envoy to France. He was a citizen of two colonies and an official of four, and later a main supporting pillar of the United States of America.

Franklin was born of lowly parentage, in Boston, January 17, 1706.

His father was an important factor in the city's lighting system—he made the tallow candles the people used. The son Benjamin turned to another means of livelihood. He was apprenticed to his brother in the printer's trade. There his genius found first expression, and he began to write secretly articles in prose and poetry for the *New England Courant*, which his brother published. They were well received, but when his brother learned of their authorship, Franklin was severely lectured for his presumption and was treated with great harshness.

Soon after, he left his brother's employment and, at the age of seventeen, started for Philadelphia, where he obtained work as a printer. There he attracted the notice of Sir William Keith, the governor of Pennsylvania, who induced him to go to England,

for the purpose of purchasing types to establish himself in business. Keith's support was soon withdrawn, and after a residence of eighteen months in London, Franklin returned to Philadelphia, where in a short time he formed an establishment with a person who supplied the necessary capital. They printed a newspaper, the *Pennsylvania Gazette*, which was managed with much ability. By Franklin's exertions a public library, improved systems of education, a scheme of insurance and other philanthropies were established in Philadelphia. In 1732 he began to publish his *Poor Richard's Almanack*, which was issued till 1757, winning for him a wide reputation as philosopher and wit. This publication reached the unprecedented sale of 10,000 copies a year.

In Boston in 1746 he saw some electrical experiments, which led to investigations which resulted in the identification of lightning and electricity, by flying a wired kite in the clouds, and the invention of the lightning conductor. As member of the provincial assembly of Pennsylvania he became very active, and was sent in 1757 to England as the agent of the province and was also soon appointed agent there of the provinces of Massachusetts, Maryland and Georgia. Oxford and Edinburgh conferred on him their highest academic degrees, and the Royal Society elected him a fellow. In 1762 he returned to America, but was again appointed agent in 1764 and took to England a remonstrance against the project of taxing the colonies. He opposed the Stamp Act and in 1774 presented to the king the petition of the first American Congress, but realizing the futility of his efforts, he returned to America and was elected member of the Continental Congress. He exerted all his influence in favor of the Declaration of Independence. In 1776 he was sent to France as minister plenipotentiary, to obtain supplies from that court, and he concluded with France the first treaty of the United States with a foreign power (1778). He was subsequently named one of the commissioners for negotiating the peace with England. On his return to his native country in 1785, he filled the office of president (governor) of Pennsylvania, was a delegate in the Federal convention in 1787, approved the Constitution and did much to secure its ratification. His works include an unfinished *Autobiography* and a great number of scholarly papers.

He died April 17, 1790. Excepting George Washington, it is agreed there never was a greater early American.

FRANKLIN, JOHN, Sir (1786-1847), an English Arctic explorer. After eighteen years' service in the British navy he was appointed to command of the *Trent*, a brig fitted out to sail north of Spitzbergen and cross the Polar Sea. The expedition was unsuccessful, but Franklin succeeded in tracing the hitherto unknown coast of North America from the mouth of the Coppermine River eastward to Point Turnagain. On his return to England he was promoted to a captaincy and made a member of the Royal Society. Later he returned and surveyed 40° of coast. In 1829 he was knighted. In recognition of his services to geographical science he received the honorary degree of D. C. L. from Oxford and the gold medal of the Geographical Society of Paris. From 1836 to 1843 Sir John was Lieutenant-Governor of Van Diemen's Land, now Tasmania. In 1845 he took command of the *Erebus* and *Terror* for an expedition in search of the Northwest passage. He never returned, and numerous search parties were sent out before any trace of him was found. In 1859 a document was found which gave the latest details of the ill-fated expedition. This paper stated that Sir John died June 11, 1847; that the ships were abandoned in April, 1848, and that the crews, 105 in number, had started for the Great Fish River. None survived, but many relics of the party were recovered. See **NORTH POLAR EXPLORATION**.

FRANKLIN, PA., the county seat of Venango County, 123 miles north of Pittsburgh, on the Allegheny River and on the Pennsylvania, the Erie, the Lake Erie, Franklin & Clarion and the New York Central railroads. The city is in the center of great oil fields, and has flour mills, machine shops, foundries, brickyards and manufacturing of tools and other articles. The place was settled about 1753. Population, 1920, 9,970; in 1930, 10,254.

FRANKS, THE, a confederation of Germanic tribes which first appeared in history in the third century A. D., and subsequently supplanted the Roman power in Gaul. In the beginning there were two groups, the Salian Franks, who lived along the lower courses of the Rhine, and the Riparian Franks, who dwelt on both banks of the Rhine along its middle course. The real

greatness of the Franks began with Clovis (481-511), who subjugated the country from the Pyrenees to Friesland and from the Atlantic to the Main; he became converted to Christianity and made it the state religion.

One of the most powerful of the Frankish kings was Charles Martel, who in 732 at Tours checked the Saracenic invasion and saved all Europe to Christianity. Under Charlemagne (742-814), who became the first Christian emperor of Rome in 800, the Franks attained supreme power in Europe, and their dominions extended from the North Sea to Croatia and Slavonia. The empire fell to pieces in the hands of weak successors, and the Treaty of Verdun, in 843, marked the virtual dissolution of the Frankish monarchy.

FRANZ-JOSEPH LAND, *frahnhts' yo'sef lahnt*, a group of sixty islands in the Arctic Ocean, lying north of Nova Zembla. The surface is a plateau of basaltic rock from 400 to 500 feet above the sea. The highest points rise to about 2,800 feet. This land is largely covered with glaciers, but in some places lichens, mosses, and other Arctic plants grow. Russia has here the world's most northerly weather station; it claims the islands, but Norway contests this.

FRA'SER RIVER, the principal river in British Columbia. It has its origin in the union of two branches. The one to the west receives its waters from a series of lakes, and, flowing in a southeasterly direction for 260 miles, it unites near Fort George with another branch from the east which rises in the Rocky Mountains. From this point it flows south and after a total course of about 750 miles it ends in the Gulf of Georgia. Its chief tributaries are the Stuart, the Chilcoten and the Thompson. Gold is found both in the Fraser and its affluents, and the salmon fisheries are important. New Westminster, Hope, Yale and Lytton are on its banks. Between Lytton and Yale the Fraser flows through some of the most beautiful scenery in the country.

FRATERNAL SOCIETIES, or **FRIENDLY SOCIETIES**, societies formed for the mutual advantage of the members and based upon the principle that by the contribution of the savings of many persons to a common fund, all can be assured of financial aid in case of sickness and death. In England these societies are called *friendly societies*. They were first organized as sick clubs, composed

of friends who met occasionally for recreation and social pleasure, and who paid small sums to a common fund, for the benefit of sick members, or to pay the funeral expenses of deceased members. These societies have now become to a large extent fraternal insurance orders, and in addition to sickness and funeral benefits, they pay many other allowances, including accident and life insurance, old age pensions, widows' and orphans' annuities, and they maintain homes and asylums for aged or invalid members. The Ancient Order of Foresters is the largest organization of the kind in England, while the Independent Order of Odd Fellows, organized in England, but now centered in the United States, is the largest order in the world. Fraternal societies in the United States have a total membership of over nine million. The principal orders and their reported membership are given below:

Freemasons	4,175,000
Royal Arch Masons.....	761,615
Royal and Select Masters.....	307,756
Knights Templars	438,192
Ancient and Accepted Scottish Rite..	535,579
Nobles of Mystic Shrine.....	564,379
Eastern Star, Order of.....	1,500,000
Odd Fellows, Independent Order of...	3,418,000
Modern Woodmen of America.....	1,115,258
Woodmen of the World.....	510,834
Knights of Pythias.....	857,820
Good Templars, Independent Order..	600,000
Loyal Order of Moose.....	625,000
Benevolent and Protective Order of Elks	900,000
Knights of Columbus.....	770,324
Order of Owls.....	650,000
Order of Eagles.....	519,000
The Maccabees	203,000
Royal Neighbors of America.....	552,294
Royal Arcanum	120,000
Improved Order of Red Men.....	515,000
Knights of Pythias of the World....	857,820

FRATERNITIES, COLLEGE, or "Greek letter" societies, as they are often called, are organizations of students in colleges and universities. They receive their names from two or more letters of the Greek alphabet, as *Delta Kappa Epsilon*. Each of these letters is the beginning of a word of the secret motto of the fraternity. Most of the large fraternities have branches, or "chapters," in nearly every large college. There can be only one chapter of the same society in a college. Each fraternity has a general government and holds conventions either annually or biennially. There are several professional fra-

ternities, composed of students in schools of medicine, law and dentistry.

The first fraternity formed was *Phi Beta Kappa*, founded at William and Mary College, Va., in 1776. This is now an honorary organization, membership in which implies a certain scholarship standard. There are at present over a hundred college fraternities in the United States. The following are the oldest, with dates and places of founding:

Alpha Delta Phi (1832, at Hamilton College, N. Y.), *Psi Upsilon* (1833, at Union College, N. Y.), *Kappa Alpha* (1835, at Union College, N. Y.), *Beta Theta Pi* (1839, at Miami College, Ohio), *Chi Psi* (1841, at Union College, Schenectady, N. Y.), *Delta Kappa Epsilon* (1844, at Yale).

The first women's societies, or sororities, to be organized were the *Kappa Alpha Theta*, at De Pauw University, in 1870; *Kappa Kappa Gamma*, at Monmouth College, 1870; *Delta Gamma*, at the University of Mississippi, 1872; *Alpha Phi*, at Syracuse, 1872; *Gamma Phi Beta*, at Syracuse, 1874.

FRAUD, an act or course of deception, deliberately practiced with the view of gaining an unlawful or unfair advantage and resulting in legal injury to another. All frauds or attempts to defraud, which cannot be guarded against by common prudence, are indictable at common law and are punishable according to the heinousness of the offense. Every species of fraud which the law recognizes renders voidable every transaction into which it enters. Fraud may be by false representation of fact, by concealment of material circumstances that ought to be revealed, by underhanded dealing or by taking advantage of imbecility or of an intoxicated person.

FRAUNHOFER, *frown'ho fur*, JOSEPH VON (1787-1826), a distinguished German physicist and optician. From a humble beginning he rose to the ownership of a successful optical business. Throughout his life he was a diligent student and investigator—that rare combination, a successful business man and a scholarly scientist. His technical skill and mathematical knowledge combined to produce exceptionally fine instruments. His inventions were numerous, including a machine for polishing parabolic surfaces, a micrometer, a heliometer and an achromatic microscope. He made the essential parts of the refracting telescope. But that which has made Fraunhofer famous was his discovery

of the dark lines in the solar spectrum which have been named for him. Out of Fraunhofer's discovery came the invention of the spectroscope and the development of spectroscopy, enabling scientists to determine the composition of the sun and other heavenly bodies. In the words of Helmholtz, it permitted "an insight into worlds that seemed forever veiled to us." See SPECTROSCOPE; SPECTRUM ANALYSIS.

FRECHETTE, *fra shet'*, LOUIS HONORE (1839-1908), the greatest of French-Canadian poets, born at Levis, Quebec. He was educated at Quebec Seminary and Laval University, and was called to the bar in 1864. As editor of the *Journal de Levis*, which he founded, he came into public notice for his revolutionary doctrines, and was compelled to leave Canada. After several years spent in newspaper work in Chicago, he returned to Canada in 1871. He practiced law in Quebec until 1874, when he was elected to represent Levis in the House of Commons. After being defeated for reelection in 1878 and again in 1882, he retired from politics and devoted himself to literature. In 1884 and 1885 he edited *La Patrie* (Montreal). His principal works, all in French, are *Mes Loirs*, *La Voix d'un Exile*, *Pêle Mêle*, *Les Oiseaux de Neige*, crowned by the French Academy, and two historical dramas, *Papineau* and *Félix Poutré*.

FRECKLES, *frek'lz*, small brownish spots which sometimes appear on the face and hands after exposure to wind and sun. Those persons who freckle have the pigment, or coloring matter, of the epidermis unevenly distributed, and instead of tanning uniformly under exposure they tan in spots. Usually fair-skinned persons are more subject to freckles than dark ones, and the red-haired are almost sure to have them. Occasionally one sees a mulatto with these spots. While children are more prone to freckle than are adults, there are people who never outgrow the tendency. There are numerous cosmetics advertised to remove freckles, most of which contain a bleach, such as hydrogen peroxide. Even if removed, the spots will return on exposure, and the only way to prevent this is to protect the face or hands.

FREDERICK, Md., the county seat of Frederick County, sixty miles northwest of Baltimore, on the Baltimore & Ohio and the Pennsylvania railroads and an interurban line. The city has large canning establish-

ments, planing mills, brick yards, flour mills and manufactories of hosiery, men's suits, and brushes. Hood College, for women, and a convent school are here.

Its chief interest lies in its connection with important historical events and characters. During the Civil War the place was twice occupied by Confederate troops, and the second time the citizens were forced to pay a very heavy ransom. Whittier has caused Frederick to be ever remembered as the scene of his famous poem, *Barbara Frietchie*. The state school for the deaf is here. There is mayor and council government. Population, 1930, 14,434.

FREDERICK I (1657-1713), first king of Prussia, was the son of Frederick William, elector of Brandenburg, whom he succeeded in 1688. He sided with the Emperor Leopold of Austria in the War of the Spanish Succession, and in 1701 obtained from the latter the title king of Prussia. Although his reign was uneventful, Frederick is remembered for his patronage of art and science. The Academy of Sciences, in Berlin, was founded by him in 1707. He was succeeded by his son, Frederick William I.

FREDERICK II (1712-1786), king of Prussia, known as **FREDERICK THE GREAT**, the "Unser Fritz" of the Germans of later periods, and the man who was idolized as the founder of Germany's military power. He was the son of Frederick William I and the princess Sophia of Hanover, sister of George II of England. He was in his youth cruelly treated by his father, and at one time narrowly escaped the death penalty for an attempt to flee to England. In 1733 he was obliged to marry the princess Elizabeth Christina, daughter of the Duke of Brunswick-Bevern. The death of his father raised him to the throne in 1740, and it was not long before he asserted the claims of the House of Brandenburg to a part of Silesia, then held by Maria Theresa. As his proposals were rejected, he occupied Lower Silesia, defeated the Austrians near Mollwitz and at Chotusitz, and the First Silesian War was terminated by the peace signed at Berlin in 1742, leaving Frederick in possession of Silesia. Soon the Second Silesian War broke out, the result of which was equally favorable for Frederick. By the Peace of Dresden he retained Silesia and acknowledged the husband of Maria Theresa, Francis I, as emperor.

During the years of peace which followed. Frederick devoted himself to domestic administration and to the improvement of the Prussian military system. He perfected the organization of his army, and learning that Maria Theresa, who had made strong alliance, meant to make a renewed attempt to gain Silesia, he anticipated his enemies by the invasion of Saxony (1756), with which the Seven Years' War began. The Peace of Hubertsburg (1763) terminated this war, and Frederick kept the territory over which there had been so much contention. He came out of this war with a reputation which promised him, in the future, a decisive influence in the affairs of Germany and Europe.

His next care was the relief of his kingdom, drained and exhausted by the contest. This he prosecuted with great diligence and liberality, making many improvements in institutions and in agriculture. On the partition of Poland in 1772 Frederick received a large accession to his dominions. In 1779 he frustrated the designs of Emperor Joseph II on Bavaria, and the War of the Bavarian Succession was terminated without a battle by the Peace of Teschen. Late in life Frederick concluded, in connection with Saxony and Hanover, the confederation of the German princes.

FREDERICK III (1831-1888), king of Prussia and emperor of Germany. In 1858 he married the princess royal of Britain, eldest daughter of Queen Victoria. He commanded the army of the Oder in the war with Austria (1866), and in the Franco-German War he led the army which ultimately forced Napoleon III and his army to surrender at Sedan. Early in 1888 he came to the throne, but he died three months later and was deeply mourned.

FREDERICK I, BARBAROSSA (1122-1190), Holy Roman emperor, received the imperial crown in 1152 on the death of his uncle, the emperor Conrad III. His principal efforts were directed to the extension and confirmation of his power in Italy. He set out on a crusade to the Holy Land in 1189 and gained two victories, but was drowned while crossing a stream in Cilicia. Frederick was one of the wisest and best of the emperors, and the belief was long current in Germany that he would some day return to rule his people.

FREDERICK II (1194-1250), son of the emperor Henry VI and of Constance, heiress of Sicily. He remained under the guardian-

ship of Pope Innocent III till 1209, when he took upon himself the government of Lower Italy and Sicily. Three years later he was crowned emperor, promising to undertake a crusade in return for the Pope's aid against his rival, Otho IV. It was not, however, until 1227 that he actually set out on that expedition. Frederick's ambition aimed at the subjugation of Lombardy, the sovereignty of all Italy and the reduction of the Popes to their old spiritual office as the leading bishops in Christendom. This led him into constant struggles in Germany and Italy. He was one of the ablest and most accomplished of the long line of German emperors.

FREDERICK VIII (1843-1912), king of Denmark, succeeded his father, Christian IX, in 1906. Frederick was married in 1869 to Louisa, daughter of Charles XV of Sweden and Norway, and eight children were born to them. At Frederick's death his son succeeded as Christian X.

FREDERICKSBURG, BATTLE OF, one of the most important battles of the Civil War, fought December 13, 1862, between a force of 125,000 Federals under General Burnside, supported by Sumner, Hooker and Franklin, and a force of 80,000 Confederates under Lee, supported by Jackson and Longstreet. After Lee's retreat from his first invasion of the North, the two armies had returned to their former positions near Fredericksburg, Lee occupying a practically impregnable position on bluffs overlooking the town. Burnside was at Falmouth, on the opposite bank of the Rappahannock. On December 12, however, he crossed the river in three divisions and advanced against Lee on Marye's Heights. After six assaults which resulted in not the slightest gain, but in terrible slaughter, he was compelled to withdraw. His loss was 12,500, while that of the Confederates was about 5,400. This battle resulted in the removal of Burnside from the command of the Army of the Potomac. See CIVIL WAR IN AMERICA.

FREDERICK WILLIAM (1620-1688), elector of Brandenburg, generally called the Great Elector. When at the age of twenty he succeeded his father, he found the country devastated by the Thirty Years' War. He began at once to regulate the finances, to repopulate the deserted towns and to build up the army. He must be considered as the founder of Prussian greatness and as the creator of a military spirit among his

subjects. His part in the wars against Louis XIV, and especially his victory over the Swedes at Fehrbellin, gave to his country a prominence which it had never before attained. He left to his son a country enlarged and improved and a well-supplied treasury.

FREDERICK WILLIAM I (1688-1740), king of Prussia, son of Frederick I and father of Frederick the Great. On his accession to the throne in 1713, he endeavored to increase the army and reform the finances, and he became the founder of the exact discipline and regularity which have since characterized the Prussian army. He had a childish love for tall soldiers, and he brought tall men from all countries and compelled them to serve in his army. A large part of Swedish Pomerania was annexed to Prussia during his reign.

FREDERICK WILLIAM III (1770-1840), king of Prussia, son of Frederick William II, whom he succeeded in 1797. During the early part of the Napoleonic struggle he remained neutral, but popular feeling finally compelled him to join the coalition against France, and Prussia suffered much through defeats at Jena, Auerstädt, Eylau and Friedland. After peace was secured, Frederick William showed himself largely in favor of the reactionary principles of Metternich and the Holy Alliance.

FREDERICK WILLIAM IV (1795-1861), king of Prussia, son of Frederick William III. When he came to the throne on the death of his father, in 1840, he gave some slight promise of a liberal government, but soon afterwards showed his reactionary tendencies, and in 1848 the people rebelled and demanded a constitution. Frederick was able to force upon the country a constitution of his own making, which allowed small concessions. Latterly his mind gave way, and he remained until his death an imbecile.

FREDERICTON, a city of New Brunswick, the capital of the province, on the Saint John River, eighty-four miles from its mouth, and on the Canadian Pacific, the Canada Government and the Fredericton & Grand Lake Coal & Railway Company railroads. The river is navigable to this point for large sea-going vessels. The city is well built and has a number of handsome public buildings, including a new post office erected in 1915. The provincial parliament and de-

partmental buildings are here, also a normal school and the University. Lumbering and trading are the chief industries, but there are also manufactures of machinery, leather and boots and shoes. The original village was founded in 1740; the present town was named in 1768. Population, 1931, 8,830.

FREE CITIES, the designation of German cities which gained complete independence in the twelfth century. They assisted the emperor in suppressing the nobles, and in return received certain privileges and immunities and the right to exercise sovereign jurisdiction within their own boundaries. At the time of the French Revolution the imperial cities numbered fifty-one. Later there were three—Hamburg, Bremen and Lübeck; they lost that honor in 1934.

FREEDMEN'S BUREAU, a bureau organized in the War Department of the United States by an act of Congress passed March 3, 1865. Its purpose was to take general charge of the enfranchised negroes of the South, and it was authorized to allot to the freedmen certain confiscated or abandoned lands. A bill continuing it for two years was vetoed by President Johnson in 1866, but was passed over the veto. The bureau continued its work until 1870 and expended over \$15,000,000. It was one cause of perpetuating the enmity of the South toward Congress, for it led to the congregation of idle and vicious negroes in the vicinity of the bureau depots and caused great hardship to the planters, who could not secure sufficient labor to harvest their cotton.

FREEMAN, MARY E. WILKINS (1862-1930), an author of numerous short stories and novels portraying middle-class life in New England, was born in Randolph, Mass. Mrs. Freeman had an intimate knowledge of her subject, and she pictured the plain and simple folk and their dull, colorless lives with an insight and a sympathy that have given her work a permanent place in American literature. Of her novels *Pembroke* is perhaps the best. Others which have received the most favorable comment of critics are *A Humble Romance*; *Jerome, a Poor Man*; *The Portion of Labor*; *The Wind in the Rose Bush*; *Shoulders of Atlas*; *The Winning Lady*; *The Green Door*; *Butterfly House*; *Copy-Cat and Other Stories* and several other volumes of short stories. After her marriage in 1901 to Dr. Charles M. Freeman she lived in Metuchen, N. J.

FREEMASONRY. See MASONRY.

FREE METH'ODISTS, members of a religious sect which separated from the Methodist Episcopal Church. It was formed at Pekin, N. Y., in 1860, by the followers of two Methodist ministers who were expelled from the conference. Though agreeing in the main with Methodist doctrines, the Free Methodists have abolished the office of bishop and substituted that of an elective superintendent, with a term extending over four years; they exclude instrumental music in their services, have only extemporaneous preaching, insist on plainness of dress and living and admit all freely to their services, having no paid reserved pews. Their membership in the United States is over 35,000, and their churches number over 1,160. They maintain seminaries at North Chili, N. Y., and at Spring Arbor, Mich.

FREEPORT, ILL., the county seat of Stephenson County, 113 miles west of Chicago, on the Pecatonica River and on the Chicago & North Western, the Chicago, Milwaukee & Saint Paul and the Illinois Central railroads. The city contains railroad shops and manufactories of motors, hardware, cheese, batteries, engines, windmills, organs and wagons. It has a public library, hospitals, an orphanage and fine public buildings. Freeport was settled in 1835 and was chartered in 1885. Here in 1858 occurred a noted debate between Lincoln and Douglas, in which Douglas set forth the doctrine later known as the *Freeport heresy*. Population, 1920, 19,669; in 1930, 22,045, a gain of 12 per cent.

FREE-SOIL PARTY, an anti-slavery party which came into existence in 1848. It was formed at a convention held in Buffalo, by representatives of the old Liberty party, but was chiefly supported by the Barnburners, or Van Buren faction of New York Democrats. The convention nominated Van Buren for President and Charles Francis Adams for Vice-President, and declared that Congress should keep slavery out of the territories. The party polled nearly 300,000 votes in that year, principally in the states of New York, Massachusetts and Ohio, and secured fourteen Congressmen. In 1852, having been deserted by Van Buren's followers, the party's candidates, received only 155,000 votes. The party was absorbed into the Republican party at its organization in 1854. See **POLITICAL PARTIES**.

FREE THINKER, one who refuses to accept ecclesiastical tradition in forming his religious opinions. Although the term has been applied to agnostics, skeptics and infidels, it was first applied to the English deists of the seventeenth and eighteenth centuries who argued for a rational as against a revealed religion. Chief among these were John Toland and Anthony Collins; the latter in the eighteenth century published *Discourse on Freethinking*. Leaders among advanced English freethinkers were Lord Bolingbroke and Hume. In France, Voltaire and the encyclopedists, D'Alembert, Diderot and Helvetius, led the opposition against revealed religion. Germany in the reign of Frederick the Great was a fertile field for freethinkers. The term is now generally applied to those found among Christians, as well as non-Christians, who refuse to accept revelation and who base their religious beliefs upon reasoned doctrines.

FREETOWN, or SAINT GEORGE, WEST AFRICA, the capital of the British colony of Sierra Leone, one of the important seaports of the western coast of Africa. The exports of the city consists largely of rubber, palm oil, gum, nuts and ginger. The town is a British coaling station and the headquarters of the British force in West Africa. It is connected with Pendembu, near the Liberian frontier, by a narrow-gauge railway. Population, 1931, 55,360, of whom about 600 were Europeans.

FREE TRADE, an economic principle which broadly relates to freedom of trade between nations. Under absolute free trade a country is relieved of all tariff restrictions which would either increase or retard the natural direction of commerce. In practice, however, no country of the first class has ever adopted such a measure. For many years Great Britain maintained a policy nearer to absolute free trade than any other nation. Its laws relating to tariffs did not discriminate between goods of foreign and domestic manufacture. This free trade principle was favorable to its position of dominance in overseas commerce, but it did impose tariffs for the sake of revenue upon such staples as coffee, tea and other articles.

As an economic principle free trade is the direct opposite of the principle of *protection*, which maintains that a state can reach a high degree of material prosperity only by protecting its domestic industries from the

competition of all similar foreign industries. To effect this, protecting countries either prohibit the importation of foreign goods by direct legislation or impose such duties as shall check the introduction of foreign goods. The principle of free trade was first advanced by Adam Smith (which see) in *Wealth of Nations*.

In the United States there never has been absolute free trade. The present-day Democratic party, in platforms as far back as 1830, declared itself the so-called free-trade party of the republic, but no tariff law ever passed by it has approached freedom of trade unhampered by tariff restrictions. Its tariff laws have usually lowered duties imposed by preceding Republican Congresses, but its tendency has been in late years toward higher schedules, placing emphasis upon protection to American workmen. Reciprocity lowers rates usually to the benefit of both countries concerned.

The theory that high tariffs foster trusts and undesirable combinations in restraint of trade is discussed in the article Protection. See, also, Tariff.

FREE WILL, the power which human beings possess of deciding for themselves. The extent to which an individual possesses this power has been the source of long controversies among both theologians and psychologists. Among theologians the principal theories are four in number, namely: First, that an act of the will is the result of circumstances and conditions beyond the person's control; second, that human affairs are governed by natural law, which acts always in the same way, hence the will always acts in accordance with that law; third, that every person's conduct is the logical and inevitable result of his previous experience and activity, and that the individual will choose in each emergency the line of conduct which his whole past experience has prepared for him; fourth, that the human will possesses of itself a special and innate power to choose between alternatives. This power it often reserves and does not always use, but when called upon, it is always present, and the individual is personally and individually responsible for every act which he does of conscious choice.

FREEZING, changing from a liquid to a solid state by reason of lowered temperature. Each liquid has its *freezing point*, or degree of cold at which it solidifies, and at which it melts after having been frozen. The

melting point is sometimes called the *point of fusion*. The freezing point of water, or the melting point of ice, is taken for one of the fixed points in the thermometer. On the Fahrenheit scale, this is 32°; on the Centigrade, 0° (see THERMOMETER). Because alcohol freezes at -203° F., it is used in thermometers in regions of extreme cold, replacing the more common mercury, which solidifies at -39° F. The freezing point of salt water is lower than that of fresh water, and the more salt and other minerals there are in solution, the greater the difference. Pressure lowers the freezing point. It is the great weight of glaciers that causes them to melt from below.

FREMONT, JOHN CHARLES (1813-1890), an American soldier and explorer, born at Savannah, Georgia, and educated at Charleston College. He entered the government service as topographical engineer and, in pursuit of a plan to make a geographical survey of all the territories of the United States, explored the Rocky Mountains, where he came into conflict with the Mexican authorities. He led a revolt against Mexican authority, and was appointed civil governor of California. In 1846 a United States force under General Kearney arrived in California, but Fremont refused to recognize Kearney's authority. For this he was court-martialed. President Polk remitted the penalty, and Fremont resigned.

Fremont was the first United States Senator from the state of California and in 1856 he was nominated as the first candidate of the Republicans for the Presidency, but received only 114 electoral votes to Buchanan's 174. At the outbreak of the Civil War, he was appointed major-general, with command of the Western Department. In this position he hindered the administration by a hasty and ill-advised order of confiscation, and he was removed from command by President Lincoln in November, 1861. In 1864 he was again an unsuccessful candidate for the Presidency, and from 1878 to 1882 he was governor of Arizona.

FREMONT, NEB., the county seat of Dodge County, on the Platte River, thirty-six miles west of Omaha, on the Union Pacific, the Chicago & North Western and the Chicago, Burlington & Quincy railroads. The industrial establishments include flour mills, iron foundries, planing mills, creameries, furniture and cement factories, and stockyards.

Dairying interests are large. The city has Midland College (Lutheran), a Carnegie Library, an orphans' home and a fine courthouse. The town was first settled in 1856, and was incorporated in 1871. Population, 1920, 9,570; in 1930, 11,407.

FREMONT, OHIO, the county seat of Sandusky County, thirty miles east of Toledo, on the Sandusky River and on the New York Central, the Wheeling & Lake Erie, and the New York, Chicago, & St. Louis railways. There is also interurban service. Being at the head of steamship navigation on the river and in the center of a rich agricultural region, it is a city of considerable commercial and industrial importance. Its chief manufactures are agricultural products, cutlery, drop forging, iron castings, batteries, dental supplies, razors and blades, sugar, and sauerkraut. A trading post was established here as early as 1785, and Fort Stephenson was erected in 1812. Fremont has a public library and two hospitals. It was the home of former President Hayes. Population, 1920, 12,466; in 1930, 13,422.

FREMSTÄD, OLIVE (1870-), a dramatic soprano, one of the greatest Wagner singers of her generation. She was born in Stockholm, Sweden, but emigrated to America at the age of twelve and lived for several years in Saint Peter and Minneapolis, Minn. She made her début as a concert singer in Boston, but later went to Berlin for study, and in 1895 made her operatic début at Cologne. After several years spent as a star in Europe she became in 1903 a member of the Metropolitan Opera Company of New York City. She sang in the leading cities of the United States and Canada in repertory including many difficult rôles. Her greatest triumphs were achieved as an interpreter of Wagner's heroines. In New York and Paris she created the part of Salome in Strauss's opera. She has been twice decorated by the French government.

FRENCH, ALICE (1850-1934), a novelist and story-writer, better known as OCTAVE THANET. She was born in Andover, Mass., but lived for many years in the west, where she depicted the life about her. Among her collections of stories are *Otto the Knight*, *Knitters in the Sun* and *Stories That End Well*. *We All* is a charming story for children. Among her later works are *The Man of the Hour*, *The Lion's Share* and *A Step on the Stair*. *The Bishop's Vagabond*

and *Expiation* have been accorded high praise.

FRENCH, DANIEL CHESTER (1850-1931), an American sculptor, whose splendid achievements gained for him an exalted place in the art world. He was born in Exeter, N. H., and at an early age went with his family to live in Concord, where Louisa M. Alcott, recognizing his talent, gave him helpful criticism and encouragement. At the age of twenty-three he completed the first of his important works, *The Minute Man*, for the centenary of the *Battle of Concord*.

His genius gained early recognition, and he received numerous commissions. He executed more than a dozen portraits, including those of *John Harvard*, *Lewis Cass*, *Emerson*, *Alcott* and *John Boyle O'Reilly*; several memorial reliefs, including his *Death and the Sculptor*, by many considered his greatest achievement; decorative sculpture, including the animal groups and the great gilded statue of the *Republic* at the World's Fair, Chicago, in 1893; statue of Abraham Lincoln, at Lincoln, Neb. (1912); and the colossal statue of Lincoln, in the Lincoln Memorial dedicated in Washington, D. C. in 1922, which "fills the hall with an overwhelming sense of Lincoln's presence." The four marble groups in front of the N. Y. Custom House are fine examples of his work.

French was one of the most productive of artists; his work was inspired by the highest ideals and executed with a fine feeling for poetry and grace. He received numerous honors—was elected a member of the National Academy of Design, of the American Academy of Arts and Letters, and of the Academy of San Luca, Rome.

FRENCH, JOHN, Sir (1852-1925), an English military leader, prominent during the World War. He was born in Ripple, County of Kent, and was a naval cadet and midshipman before he entered the army. In his early military career he fought in the Sudan and Natal, and during the Boer War had command of cavalry. In 1907 he was raised to the rank of general, served as inspector-general of the forces until 1911, and chief of the imperial general staff from 1911 to 1914. In 1902 he was knighted, and in 1913 was made field marshal. General French was given command of the first British army corps under General Haig in Belgium at the outbreak of the World War. In

1917 he was made Lord-Lieutenant of Ireland; reappointed in 1919. In 1915 he was given title of Viscount, and in 1921 that of Earl of Ypres.



FRENCH AND INDIAN WARS, a name given to the series of four wars between the French and the English in America in the seventeenth and eighteenth centuries. They were the result partly of quarrels among the nations of Europe, and partly of the divergent claims of England and France in America; England claimed that settlements upon the coast gave title to land stretching from sea to sea; France, that settlement at the source of a river gave

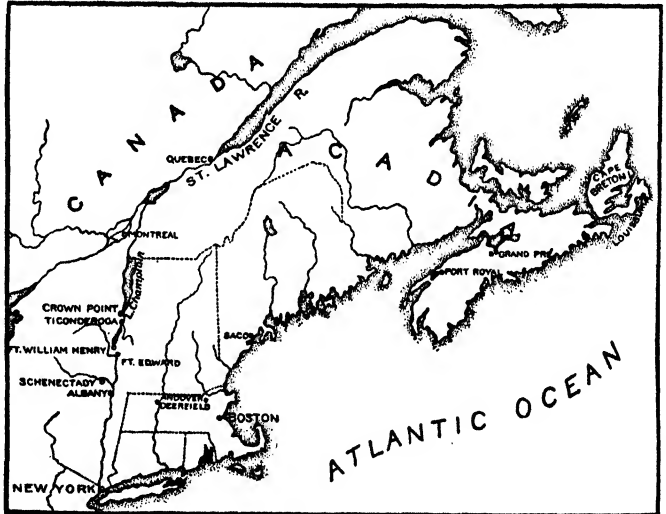
title to all lands drained by the river. As the colonies of both countries expanded westward, migration began, and the representatives of the rivals soon came into conflict.

King William's War. The first war, known in America as King William's War, was simultaneous with the War of the Palatinate in Europe, begun in 1689, and its opening was signalized by expeditions against the frontier towns of New York and New England sent out by Governor Frontenac of Canada. Hundreds of settlers were captured and killed. In retaliation the English colonists sent out two expeditions, one by land and one by sea, for the conquest of Canada. Both failed, and at the Peace of Ryswick in 1697 mutual restitution of all conquered territory in America was made. Thus the sufferings and hardships of the American campaign, undertaken because greedy kings in Europe were quarrelling, made absolutely no change in American history.

Queen Anne's War, the second of the series of conflicts was the outgrowth of the War of the Spanish Succession waged in

Europe. It began in the southern colonies with an expedition from South Carolina against Spanish towns in Florida and a counter-attack upon Charleston. The alliance between the Algonquin Indians and the French in the north proved disastrous to frontier settlements in New England, especially Deerfield and Haverhill, Mass. The English dispatched three expeditions against Acadia, the last one, in 1710, being successful. By the Peace of Utrecht in 1713 the Hudson Bay territory, Acadia and Newfoundland were ceded to England. This was another war in which only the interests of kings were in jeopardy.

King George's War. This consisted of the American operations in the War of the Austrian Succession. The first movement was a French expedition against British ports in New England and Newfoundland. The most important event of the contest was the brilliant campaign against Louisburg, Cape Breton Island, conducted by colonial forces under William Pepperell of Maine. The stronghold surrendered June 17, 1745. By the Treaty of Aix-la-Chapelle (1748), Louis-



FRENCH AND INDIAN WARS IN THE NORTH AND EAST

burg was restored to France, contrary to the wishes of the New Englanders, and all other conquered territory was restored to its status before the war. This, the third of the inter-colonial wars, inevitably led to another, for the Indians had made alliances and strong enmities, and the English were victims.

The French and Indian War. The last of the four wars, often known as the French

and Indian War, was an American phase of the Seven Years' War between England and France. The three preceding struggles had accomplished nothing toward a final settlement of the territorial controversy, and frontier settlements of the two nations in the north and west constantly approached each other. The opening gun of the war was fired in 1755, when a force of Virginian volunteers under George Washington was compelled to surrender Fort Necessity, which they had built for the defense of the western region. In the same year an English force under General Braddock retaliated for this defeat by an attack upon Fort Duquesne, at the junction of the Monongahela and Allegheny rivers, on the site of the English Fort Pitt. The force was attacked in ambush and completely routed, with great loss. Other expeditions against Canada, by way of Lake Champlain and Fort Niagara, were also unsuccessful. Not until 1758 did the tide of fortune turn in favor of England. In that year Louisburg and Fort Duquesne were captured and in the following summer Ticonderoga, Crown Point and Niagara. The crowning and closing event of the war was the successful invasion of Canada by an English force under General Wolfe (see WOLFE, JAMES; MONTCALM, LOUIS JOSEPH; QUEBEC). By the terms of the Treaty of Paris in 1763, Canada and all lands east of the Mississippi were ceded by France to England. Louisiana and all lands west of the Mississippi and the Isle of Orleans were ceded by France to Spain, and Florida was ceded to England by Spain. Thus, France was driven from the North American continent and Spain remained the only rival of England in the New World.

FRENCH EQUATORIAL AFRICA, known until 1910 as FRENCH CONGO and prior to that time as the CONGO FREE STATE (see CONGO), covers an area of 982,049 square miles, and has a population of 2,845,936, mostly native races. The natives within recent years have been dying rapidly, owing to the prevalence of the sleeping sickness (which see), a scourge which science has not yet mastered.

The better though smaller part of the province lies along the Atlantic coast, under the equator, with Kamerun on the north. At the southeastern point of Kamerun another part extends northward, and this section is by far the larger. It has no definite northern

boundary, but merges into French West Africa and the Sahara Desert. Anglo-Egyptian Sudan is on the east of this section; the Belgian Congo bounds the southern section in the east.

The principal products of this territory are ivory, rubber, coffee, cocoa and palm oil. Loanga has the best harbor, but there is considerable commerce from Libreville and Port Gentil; the capital is Brazzaville, on the Congo River, which forms a part of the eastern boundary.

The coast was first seen in 1740 by the Portuguese. In 1840 the French established a post, and in 1847 Libreville was founded. French interests continued to dominate the country, and in 1908 its authority was established by agreement of the powers.

FRENCH GUIANA, *ge ah'nah*, a colony of France in South America, lying between Dutch Guiana and a projection of Brazil, facing the Atlantic Ocean. It is the smallest of the three divisions of South America which recognize European sovereignty (see BRITISH GUIANA; DUTCH GUIANA). The area of the colony is 34,700 square miles, which is about that of South Carolina. The capital city is Cayenne; population, 1931, 10,350. Only the coast area is called French Guiana; the almost unknown interior is named Inini.

French Guiana has been maintained largely as a penal settlement since 1855, and to it France sends prisoners convicted of the most serious crimes. Exclusive of members of the penal colony, which numbers over 4,000, the population in 1931 was 47,350. The convicts are placed in four localities. The principal one is Ile du Diable (Devil's Island), where Alfred Dreyfus (which see) was imprisoned; it lies off the coast about thirty miles from Cayenne.

The southern point of the colony is 125 miles north of the equator, but there the elevation is 2,700 feet, and the climate is quite healthful. Near the coast the land is low, but somewhat higher than in the Dutch and British colonies to the west. The area under cultivation does not exceed 15,000 acres near the coast; corn, coffee, sugarcane, rice and tobacco are staple products.

The colony is governed by a privy council of five members, over whom is the governor; the six are appointed in the mother country. A legislative branch of sixteen members is chosen every two years by the French residents of the colony.

FRENCH INDO-CHINA, the name applied to the French possessions in South-eastern Asia, including the colonies of Cochinchina and the protectorates of Cambodia, Annam, Laos and Tongking. It is bounded on the east and south by the South China Sea, on the southeast by the Gulf of Siam, on the west by Siam and on the north by China. The total area is estimated to be 256,200 square miles. The seat of government is Saigon. At the head of the administration is a Governor-General, under whom are the governor of Cochinchina and the superiors of the four protectorates. In 1900 France leased from China the Bay of Kwang Chow Wan, with its islands and a strip of mainland coast, for ninety-nine years. Population, about 18,000,000.

FRENCH LANGUAGE. At the time of the conquest of Gaul by Julius Caesar, the principal dialects spoken by the inhabitants were Celtic (see CELTS). After the conquest these dialects were gradually supplanted by Latin (except in Brittany, where a Celtic dialect still holds its ground). In Gaul Latin underwent many modifications. Celtic words were incorporated, Celtic habits of speech were retained, and new sounds were introduced. Not only the popular speech but the language of scholars underwent a change, and by the seventh or the eighth century a distinct language had developed, with a clear line of demarcation between the literary and the common speech. With the invasion of the Franks came still further modifications. The half-barbarous conquerors, incapable of mastering the intricacy of Latin inflections, neglected them, using the simpler forms. They enlarged the vocabulary by adding a number of words, chiefly terms of war and hunting. After the Franks in Gaul had abandoned their native language and had adopted this new tongue it became known as the Romanic. The oldest known monument of the new dialect is the oath of Louis the German, taken at Strassburg in 842.

In the ninth and the tenth century two main branches or groups of dialects came to be recognized, the *langue d'oc*, spoken in the districts south of the Loire, and the *langue d'oïl*, spoken in a variety of dialects in the provinces of the north and east. The words *oc* and *oïl* meant "yes" in the respective districts. *Langue d'oc* may be said to have reached its height in the Provençal poetry and dialect, known especially in connection

with the Troubadours. In the thirteenth century the political superiority of the north brought about the decline of the *langue d'oc*, and a dialect of the *langue d'oïl*, spoken in the central province of Ile de France, where the capital, Paris, was, came to be regarded as the classical language of the country. At the beginning of the sixteenth century Francis I prohibited the use of Latin at court and in the public tribunals and formally recognized French as the national language. As one of the Romance languages, it is a sister tongue of Italian, Spanish and Portuguese. See LATIN LANGUAGE; PHILOLOGY.

FRENCH LITERATURE. See LITERATURE, subhead *French Literature*.



FRENCH REVOLUTION,

THE, the great revolution in France against absolutism, or autocratic government, near the end of the eighteenth century. The term in this article is understood to mean the years between the outbreak of the struggle in 1789 and the overthrow of the Directory by Napoleon in 1799. For the causes which led up to

the struggle, see FRANCE, subhead *History*.

The summoning of the States-General in 1789 was virtually an abandonment of the principle of absolute monarchy in France. The first question which this body was forced to settle was that of the method of voting. The old method had been by class rather than by poll, but if this were pursued, it would mean that the nobles and clergy together could counteract the efforts of the third estate for reform. The nobles and clergy proved firm in their refusal to vote by head, and the third estate withdrew in June, 1789, and declared itself the National Assembly of France. Later, this body was joined by many of the nobles and clergy, and assumed the name Constituent Assembly. It voted to adopt a constitution before adjourning and declared the inviolability of its members.

The dismissal of Necker, the popular minister, a step to which Louis XVI was led by his desire to offset the measures of the Assembly, brought about the first open insurrection of the people—the storming of the Bastille. The Assembly next declared a

THE FRENCH REVOLUTION

1789-1799

LIBERTÉ
ÉGALITÉ
FRATERNITÉ

Noble Chazotte

Cour de Mirabeau

Danton

Métil

Robespierre

Marquis de Lafayette

Monsieur Robespierre

Charlotte Corday

Madame du Barry

Captain Bouquet de Lamoignon

Hébert

THE GUILLOTINE

feudal rights and privileges abolished; the National Guard was organized, and the nobles who were unwilling to accept the Revolution left France. In October of the same year a mob, composed largely of women, rushed to Versailles, put to death the royal guard and forced the king and queen to return with them to Paris. The Constituent Assembly also removed to Paris and there continued to work on the new constitution, which was ready in July, 1790. The king's oath to support the constitution was regarded by the people with suspicion, and this suspicion was increased by the constant attempts of the émigrés to gain assistance from foreign powers against the revolution (see *EMIGRÉS*). In June, 1791, the king and queen tried to escape from France, but were captured and brought back to Paris, where Louis was made to take oath on a revised constitution. The Constituent Assembly dissolved itself in September, 1791, and was followed by the Legislative Assembly.

In 1792, at a time when peace was especially needed in France, war was begun with Austria and Prussia, and the early defeats of the French forces were the cause of mob disturbances in Paris. A rioting band broke into the Tuilleries in August, killed the king's guard and forced Louis to throw himself on the mercy of the Legislative Assembly. The mob then forced the Assembly to imprison the king in the Temple and to declare him suspended from his royal office. In September, 1792, as a result of further reports of French defeats, serious riots broke out in Paris, and hundreds of the inmates of the prisons were murdered. The Battle of Valmy, in which the French were victorious, served to quiet for a time the disorder in Paris. The success in war was continued under the National Convention, which assembled September 20, 1792. Savoy was invaded, Belgium was conquered and Dumouriez defeated the Austrians at Jemmapes. Meanwhile, however, France had been declared a republic by the National Convention, and the announcement was now made that Belgium and Savoy were to be annexed to France. This brought forward new enemies for France, and these enemies were strengthened in their opposition to the revolutionary movement by the execution of the king.

The Convention was rent by the strife of two parties, the Jacobins and the Girondists. The latter at first had the majority, but their

very unpractical character made them unfit to manage affairs at so critical a time, and the radical Jacobins before long gained control. They brought the king to trial in December, 1792, and he was condemned to death and executed January 21 of the following year. In June of that year the Jacobins were strong enough to arrest and put to death the leaders of the Girondists, and they thus held matters entirely in their own hands. The French armies were now meeting defeat at the hands of Great Britain, the Netherlands and Spain and these defeats led to still more revolutionary measures at Paris.

France was then controlled by a Committee of Public Safety, which consisted of a number of the most radical members of the Convention, under the leadership of Danton. The Reign of Terror began with the installation of that body. Among the first who fell under the suspicion of the government were Philippe Egalité, who had renounced his rank and had early identified himself with the Revolution, Marie Antoinette, and Madame Roland. All were given mock trials and sent to the guillotine. Gradually one man began to stand out supreme—Robespierre. First, with the help of Danton, he overthrew Hébert and his party and sent them to the guillotine. He then turned upon Danton and his followers, who had ventured to suggest that the Terror was passing beyond all bounds, and had them put to death. Robespierre's own turn soon came, however, and in July, 1794, he himself was beheaded (see *TERROR, REIGN OF*).

The more moderate members of the Convention, who had been expelled earlier, were now brought back, and in 1795, by a new constitution, the government was placed in the hands of a Directory of five persons and two legislative bodies, the Council of Ancients and the Council of Five Hundred. When an attempt was made to enforce this constitution, an insurrection in Paris was the result, and it was in suppressing this insurrection that Napoleon Bonaparte first became really prominent. Napoleon, in command of the French army in Italy, won some brilliant successes, and it seemed as if the good fortune which had attended the Convention in its latter days would continue under the Directory. Such, however, was not the case. The Austrians, while Bonaparte was absent in Egypt, invaded Italy and several

times defeated the French. With the internal conditions under the Directory, also, there was great dissatisfaction. The financial difficulties could not be met; it was perceived on all sides that the government was generally weak and inefficient, and there were threats of a royalist reaction. The one desire of France now seemed to be for a strong central government, and Napoleon, still absent in Egypt, perceived that his opportunity had come. He returned to France in October, 1799, and three weeks later overthrew the Directory and put himself at the head of affairs.

For the further course of the Revolution, see Napoleon I. See, also, articles on men mentioned above, and Marat, Jean Paul; Mira-beau, Gabriel Honore Riquetti.

FRENCH SOMALI. See SOMALILAND.

FRENCHTOWN, BATTLE OF. See RAISIN RIVER, MASSACRE OF.

FRENCH WEST AFRICA, a possession of France, confirmed as such by the powers in 1899. It extends practically half across the continent at its widest part, from Senegal, on the Atlantic Ocean, eastward to about 10° east longitude, and includes the colonies of Senegal, Guinea, Ivory Coast, Dahomey, French Sudan, Upper Volta, Mauritania and Territory of Niger. The total area is about 1,800,000 square miles; population, about 12,300,000, nearly all of whom are native blacks. The colonies are each under a Lieutenant-Governor, and over all is a Governor-General, whose capital is at Dakar.

FRES'CO, or **FRESCO PAINTING**, a method of mural painting in water colors on wet grounds of lime or gypsum. Mineral or earthy pigments are employed, which resist the chemical action of lime. In producing fresco paintings, a finished drawing on paper, called a cartoon, exactly the size of the intended picture, is first made, to serve as a model. The artist then has a limited portion of the wall covered over with a fine sort of plaster, and upon this, while wet, he traces the part of the design intended for the space. As it is necessary to the success and permanency of his work that the colors be applied while the plaster is yet damp, no more of the surface is plastered at one time than the artist can finish in one day. A portion of the picture once commenced needs to be completely finished before leaving it, as fresco does not admit of retouching after the plaster has become dry. On completing a day's work, the artist removes all unpainted

plaster, cutting it neatly along the boundaries of forms so that the joining of the plaster for the next day's work may be concealed.

The art of fresco painting is very ancient. Specimens of it are found in India, Egypt, Mexico, Pompeii and other places. After the beginning of the fifteenth century fresco painting became the favorite method of the Italian masters, and many of the great works of such artists as Michelangelo, Raphael and Fra Angelico are frescoes on the walls of palaces and churches. Some ancient wall paintings are executed in what is called *dry fresco*, or *tempera*, which differs from the true fresco in so far that it is executed on dry plaster made moist with lime water before the colors are applied. Fresco painting has in recent years been revived. See PAINTING.

FRESNO, *frez'no*, CALIF., the county seat of Fresno County, 207 miles southeast of San Francisco, on the Southern Pacific and the Atchison, Topeka & Santa Fé railroads. The city is in the famed San Joaquin Valley, in an agricultural and stock-raising district. It exports enormous quantities of raisins, wines, brandies, grapes, oranges, olives and other fruits. Fresno has Chandler Municipal Airport, a Carnegie library, a Federal building, a city hall, a courthouse, and a civic auditorium. Near the city is an irrigated experiment farm conducted by the University of California. The place was settled in 1872, and became the county seat two years later. Population, 1920, 44,616; at the census of 1930, 52,513.

FREY, *fri*, in Scandinavian mythology, the god of sunshine, of pleasure and of fruitfulness. The other gods, by whom Frey was much beloved, made him various presents. Among these was a magic sword, which would fight by itself the moment it was drawn from its scabbard; a ship which, while it was large enough to carry all of the gods and their attendants, could be folded up at will like a napkin; and a boar with golden bristles, on which Frey rode over land and sea with incredible swiftness. Frey fell in love with Gerda, and to obtain the assistance of his servant in gaining Gerda as his wife he was obliged to give up his wonderful sword, which was greatly missed afterwards in all combats of the gods.

FREYA, *fri'ah*, in Scandinavian mythology, the sister of Frey and the goddess of love and beauty, corresponding to the Venus of the Greeks. The conception of her differs

somewhat from the classical conception of Venus, as she was regarded to some extent as a war goddess and often accompanied the valkyries when they flew down to the battle-fields to carry away the slain warriors. Half of the heroes slain belonged to Freya, and she entertained them sumptuously in her palace.

FRIAR. See MONASTICISM.

FRICTION, *frik'shun*, in physics, the resistance offered to the movement of one body by another, due to contact of surfaces. If two smooth cubes are placed one on top of the other the topmost may be lifted without resistance except that of gravity. If, however, the topmost is pushed, there is friction. If the surfaces are rough the friction is greater. In all machinery construction friction is a factor to be reckoned with. No engine can be run without it, but it can be reduced to the minimum with oil and graphite. These lubricants greatly increase the smoothness of surfaces in contact, causing them to slip against one another with the least friction possible.

FRIDAY, the sixth day of the week, the Mohammedan Sabbath, or day of assembly. In the Roman, Anglican and Greek churches Fridays are considered days of general fasts or obligation, because Christ was crucified on Friday. Because of its association with the Crucifixion, Friday is set aside as a day for the execution of convicted criminals. The old superstition about its being an unlucky

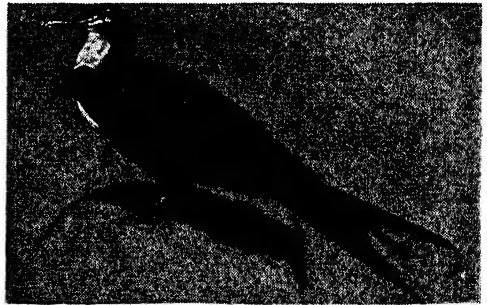
day is also connected with the Crucifixion. The name is derived from the German *freitag*, which means day of *Freya*.

FRIENDLY ISLANDS. See TONGA ISLANDS.

FRIENDS. SOCIETY OF. See QUAKERS.

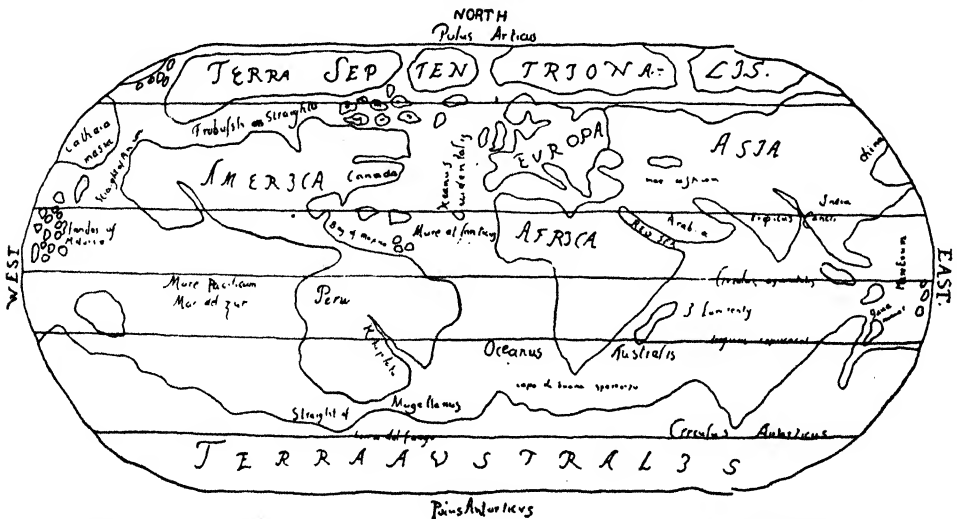
FRIGATE, among wooden ships of war of the older class, now wholly obsolete, a vessel of a size larger than a sloop or a brig and less than a ship of the line. It carried guns on the main deck and on a raised quarter-deck and forecastle. Such ships were often speedy, and were much employed as cruisers in the eighteenth and early years of the nineteenth century. See SHIP.

FRIGATE BIRD, or **MAN-OF-WAR BIRD**, a tropical web-footed bird, related to the pelican. It takes its name from the



FRIGATE BIRD

savage attacks it makes upon gulls and other birds, when they are carrying their prey. In flight the frigate bird is powerful and grace-



Map of the World published with the Account of Frobenius's Voyages in the year 1578
MAP OF THE WORLD, ACCORDING TO FROBISHER

ful, and its prey is taken upon the wing. In the breeding season the pouch under the male's bill, which he is able to inflate, becomes a bright scarlet. The birds breed in large colonies on rocky cliffs or in the tops of tall trees on uninhabited islands. The upper plumage is dark brown.

FRIGGA, or **FRIGG**, in Northern mythology, the wife of the god Odin and the highest of the goddesses, corresponding in some respects to Juno in classical mythology. She is often confounded with Freya, who, however, is the counterpart of Venus. See ODIN.

FROBISHER, **MARTIN**, Sir (1535-1594), one of the greatest of Elizabethan navigators. He made three expeditions to the Arctic regions, for the purpose of discovering a northwest passage to India, and founded a settlement north of Hudson Bay. He later took part in numerous expeditions against Spain, and was killed in an attack at Brest.

FROEBEL, *frö'bel*, **FRIEDRICH WILHELM AUGUST** (1782-1852), a German educator, founder of the kindergarten system of instruction. He was the son of a Lutheran minister, and during his boyhood and youth obtained only a limited education. He learned forestry, but was not successful, and began teaching in a model school at Frankfurt-on-the-Main in 1803. Four years later he joined Pestalozzi at Yverdun, where he remained three years studying Pestalozzi's methods. After this he studied at the universities of Göttingen and Berlin. Froebel enlisted in the volunteer movement against Napoleon, and after that he founded the celebrated school at Keilhau, where he wrought out his system of instruction during the fifteen years that he remained with the institution. Doctor Painter, in his *History of Education*, summarizes the fundamental ideas of Froebel's system as follows:

"1. The task of education is to assist natural development towards its end. As the child's development begins with its first breath, so must its education also.

"2. As the beginning gives a bias to the whole after-development, so the early beginnings of education are of most importance.

"3. The spiritual and physical development do not go on separately in childhood, but the two are closely bound up with each other.

"4. Early education must deal directly with the physical development and influence the spiritual development through the exercise of the senses.

"5. The right mode of procedure in the exercise of these organs is indicated by nature in the utterances of the child's instincts, and

through these alone can a natural basis of education be found.

"6. The instincts of the child, as a being destined to become responsible, express not only physical but spiritual wants. Education is to satisfy both.

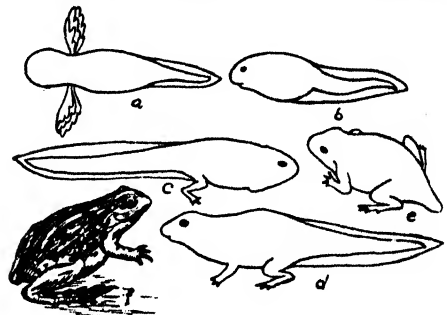
"7. The development of the limbs by means of movement is the first that takes place and therefore claims our first attention.

"8. Physical impressions at the beginning of life are the only possible medium for awakening the child's soul. These impressions should therefore be regulated as systematically as the care of the body and should not be left to chance."

In the article *Kindergarten* will be found a detailed account of Froebel's life.

FROG, a small, tailless animal, belonging to the same class as toads, newts and salamanders. These creatures, the amphibians (which see), start life as water animals, and in a mature state can live both on land and in water. Frogs differ from toads in having teeth and in possessing a less bulky body than their near kin (see TOAD).

Frogs are common in all parts of the world except Australia and South America.



DEVELOPMENT OF A FROG

a, b, c, d, e and f show the successive stages of development.

There are many species, and they inhabit widely different regions, but usually prefer swampy places and the shores of lakes and streams. The young frog, which is known as the tadpole, bears no resemblance to the parent. It has neither mouth nor limbs, but has branching gills and a long tail, with which it swims about. Its body looks like a roundish lump of dark jelly. But soon the mouth develops, the gills disappear and, as the days go on, the hind legs appear. The fore legs follow, the tail is gradually absorbed and thus the animal changes into the frog. It is an interesting transformation which any person may observe, if he will keep a few of the tadpoles where he can see them daily.

The mature frogs breathe by lungs and cannot live in water without coming to the surface for air. They swim with great rapidity and move by long leaps, being able to jump many times their own length. In the tadpole stage, frogs live chiefly on vegetable matter, but the mature frog lives on insects, slugs, snails and the like. The flesh, especially that of the hind legs of certain species, is considered very choice food, and in France, particularly, frogs are bred for the market in large numbers.

FROHMAN, *fro'man*, CHARLES (1860-1915) and DANIEL (1853-), two brothers prominent as American theatrical managers, both born at Sandusky, Ohio. Daniel after a few years of newspaper work began his theatrical career as manager of a traveling company. Subsequently he managed several New York theaters, organized the Daniel Frohman Stock Company and became closely associated with the so-called theatrical trust, formed by his brother.

Charles Frohman was for many years prior to his death the most prominent figure in the American theatrical business. He had only a rudimentary schooling, but his educational deficiencies were in a large measure offset by an extraordinary understanding of human nature. After managing several road companies, he became manager of some of the best theaters in New York City and of the Duke of York Theater in London. In 1895 he organized a theatrical syndicate which gained control of most of the best stage talent in America. During one typical season he employed 795 actors and paid out \$25,000 a week in salaries. He was instrumental in bringing forward many well-known American actors, among whom are Maude Adams, Julia Marlowe and John Drew. He lost his life in the *Lusitania* disaster, May 7, 1915.

FROISSART, *frwah sahr'*, JEAN (about 1338- about 1410), French poet and historian. He received a liberal education and took orders in the Church, but his inclination was always toward poetry and tales of chivalry. From 1361 to 1366 he was secretary to Philippa, queen of England, whose favor he had won by his poetry. After the death of Philippa he became curé of Lestinnes, and during his quiet life there he worked at his *Chronicles*. After many uneventful years, he began his travels and journeyed to many parts of the world, visiting famous men and receiving their accounts of wars and expedi-

tions in which they had engaged. Little is known of the closing years of his life. His great work is the *Chronicles*, in the four books of which he told in a vivid manner of the wars and other events of the fourteenth century.

FRONDE, *frohNd*, the name given to a struggle which took place in France between 1648 and 1653. It was directed against Mazarin and consisted of two distinct movements: the first, an attempt of the Parlement of Paris to limit the royal authority; the second, an ambitious attempt of the great nobles to gain power. In order to curb the royal authority; the Parlement refused to register certain objectionable edicts in regard to taxation, and when Mazarin arrested two members of the Parlement, an insurrection arose which forced the court to agree to demands of that body. By the following year the court party felt strong enough to withdraw the concessions made, and in the war which now broke out, Parlement had the aid of some of the great nobles of the state. The nobles were for the most part successful, but as they had no definite program laid down, they allowed their gains to slip through their fingers, and Mazarin was able to regain his old power.

The name *Fronde* is the French for *sling*, and was applied as a term of contempt, with reference to the use of the sling among the street urchins of Paris.

FRONTENAC, *frohNt nak'*, LOUIS DE BAUDE, Comte de (about 1620-1698), a French soldier, one of the early governors of New France in America. He had served with distinction in Italy, Flanders and Germany before he was made governor of New France in 1672. The explorers Joliet, Marquette and La Salle were encouraged by him, and he established a number of strong military posts. Despite the fact that New France prospered under his rule, he was recalled in 1680, but nine years later he was reinstated. During King William's War with the English he succeeded in forcing the English fleet to retreat from before Quebec in 1690. Another event of his second administration was a struggle with the Iroquois Indians of New York, whom in 1696 he compelled to sue for peace.

FROST, the name given to the state of the weather when the temperature is below the freezing point of water; also the name given to the moisture condensed from the atmos-

where, when the dew point is below 32° F. Frost is not frozen dew, but vapor frozen as it condenses. It is generally seen most profusely in spring and autumn, because at those times, while, on clear nights, the cold is sufficient to freeze the vapor, the days are at the same time sufficiently warm to cause a very considerable quantity of moisture to evaporate into the air. Frost is very destructive to vegetation, owing to the fact that water, which is generally the chief constituent of the juices of the plants, expands, when freezing, and bursts, thus destroying the minute cells of the plant. The subject of protection from frost has been given especial attention by the United States Weather Bureau, and the results are summarized in a bulletin entitled *On Frost Protection*. See **Dew**.

FROSTBITE, one of the effects of severe cold on some part of the body. Chilblains are mild cases of frostbitten hands and feet. The part affected turns purplish red, it swells, and at times gives rise to pain or an itching sensation. The simplest treatment of light frostbite consists in coaxing back the vitality of the part affected by means of gentle rubbing with snow, ice or cold water. The return of blood brings heat and fever, which may be very severe if the return is sudden. Hence, cold applications should be used before warm ones. If the freezing has been very severe or long-continued, the parts may die, decay and slough off. In such cases prompt surgical treatment is necessary.

FROUDE, *frood*, JAMES ANTHONY (1818-1894), an English historian and miscellaneous writer. He was educated at Westminster School and at Oxford and after his graduation became engaged in the Tractarian movement (see **TRACTARIANISM**), as advocated by Newman. He even took orders in the Church, but resigned before long and gave himself up to historical study. Between the years 1856 and 1869 appeared his great work, *The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada*, which was very popular, but received only doubtful approval from historians. He was elected rector of Saint Andrews University in 1869, traveled in the United States in 1872 and aroused considerable opposition by his lectures on the Irish question. Later he traveled in South Africa, Australia and the West Indies and gave accounts of his journey in lectures and books. Carlyle appointed

Froude his literary executor, and after Carlyle's death Froude published *The Reminiscences of Carlyle, Letters and Memorials of Jane Welsh Carlyle and Thomas Carlyle: a History*. These provoked an extraordinary amount of interest and controversy, because of the unreserved accounts they gave of the life of the Carlyles. Among Froude's other works are *The English in Ireland in the Eighteenth Century*, *Life of Lord Beaconsfield and Life and Letters of Erasmus*.

FRUITS, *frutes*, a term which in the popular sense is applied to the luscious food products of a large group of trees, shrubs and bushes. In botany the word refers to the seed of a plant and the parts which cover it. The most important fruits include the apple, plum, peach, pear, orange, banana, cherry, fig, grape, date, lemon, berries and melons. The cultivation and marketing of fruits constitute an industry of great importance in the United States and Canada; the former country exports each year fruits valued at more than \$31,000,000.

Fruits are eaten both raw and cooked, and they are dried, canned, preserved and used in making butter, jam, jelly and marmalade. Fresh fruits are valuable as food, because they contain acids and salts that are of benefit to the system, and because their agreeable taste, flavor and appearance have a stimulating effect on the digestive organs and on the appetite. Fresh fruits also contain a large amount of water, and are mildly laxative. Care should be taken not to eat unripe fruits or those partially decayed. Dried fruits have a higher percentage of nutritive content than have fresh fruits, and the amount of sugar in fruit is increased by canning or preserving operations.

Related Articles. For descriptive matter on the various fruits consult the following titles:

Alligator Pear	Fig	Nectarine
Apple	Gooseberry	Olive
Apricot	Grape	Orange
Banana	Grapefruit	Papaw
Bergamot	Guava	Peach
Blackberry	Huckleberry	Pear
Breadfruit	Juneberry	Persimmon
Casaba Melon	Kumquat	Pineapple
Cherry	Lemon	Plum
Citron	Loganberry	Pomegranate
Cocoanut	Loquat	Prune
Crab Apple	Mango	Quince
Cranberry	Melon	Raspberry
Currant	Mulberry	Strawberry
Date	Muskmelon	Watermelon

FU-CHOW, or **FOO-CHOW**, CHINA, a very old and prominent city, capital of the province of Fukien. It is on the Min River, about thirty miles from its mouth, and is one

of the five Chinese ports thrown open to foreign commerce by the treaty of 1843. The trade is extensive, the chief exports being tin, timber, matches, cotton goods and fruits. Fu-chow has a large naval arsenal, government shipyards and dry docks. The city is enclosed within a wall twenty-five feet high and is entered through seven gates guarded by watchtowers. Connecting it with a densely-populated island is a bridge 1,350 feet long, called the "Bridge of Ten Thousand Ages." Within the city large banyan trees ornament the gardens and squares. Population, about 322,725.

FUCHSIA, *fu'she ah*, a genus of beautiful flowering shrubs, named after the discoverer, Leonard Fuchs, a German botanist. There are about fifty species, natives of South America, Mexico and New Zealand, but now worldwide in cultivation. The gracefully-drooping, jewel-like blossoms, with pearly and amethystine petals and dangling stamens and pistils, have appropriately been called *ladies' eardrops*.

FUEL, as generally considered, is any plentiful substance that will burn and produce heat (see COMBUSTION). The most important fuel materials in the past have been wood and coal. The latter has not yet lost supremacy, for nearly 500 million tons are mined in the United States alone every year; but as the forests diminish, wood is becoming scarcer. On farms it remains the principal fuel, but even here coal is finding a large market. For certain industrial processes, coke and charcoal are widely employed, and coke is used in a limited way as a domestic fuel. Peat is widely used in countries where peat bogs are plentiful and where other fuel is scarce; Ireland provides the best example.

Liquid fuels and gas are supplanting coal and wood quite rapidly in urban centers. The invention of oil burners has made petroleum a popular fuel; though in most places it is more expensive than coal, it is cleaner, and under thermostat control (see THERMOSTAT) provides practically unchanging temperature. Gas for heating, also more expensive than coal in most sections, challenges the rapid increase in oil burners, and it is subject to the same thermostat control. All modern naval vessels now use petroleum as fuel, as do the great ocean liners.

In internal-combustion engines, those of the automobile, tractor, and airplane being most conspicuous, gasoline is up to this time

universally employed, though substitute fuels for these motors are likely to be developed. At the present time in the United States alone, motors of all kinds use more than 16 thousand million gallons of gasoline every year. Natural gas from fields largely in the west and southwest is piped hundreds of miles for use in industry and to a considerable extent for domestic purposes.

Related Articles. Consult the following titles for additional information:

Charcoal	Coke	Peat
Coal	Gasoline	Petroleum

FUGITIVE SLAVE LAWS, in United States history, two statutes providing for the return of slaves who had escaped from one state to another. Most of the colonies had laws guaranteeing the return of fugitive slaves. The Ordinance of 1787 contained a clause to that effect, and the Constitution specified that slaves escaping into a free state should be delivered to their owners. Congress in 1793 passed an act allowing the owner of a slave, by making an affidavit before a Federal judge, to secure a warrant for his arrest and removal. The slave could not testify in his own behalf. The abuses of this law led to a demand on the part of the North for an amendment requiring more evidence for the granting of a warrant, and this led to the passage of personal liberty laws by many Northern states, forbidding state officials to help in reclaiming alleged fugitives. These laws were declared constitutional by the Supreme Court. In 1850, among the compromise measures passed (see COMPROMISE OF 1850) was a fugitive slave law, placing in the hands of Federal officials the whole process of reclaiming fugitive slaves, adding many officials to the service, inflicting severe penalties for violation and declaring bystanders who refused to assist a government official guilty of treason. The owner's oath was sufficient evidence, and he could take this oath before a court in his own state. The passage of this law was one of the most important incidents which led to the CIVIL WAR.

FUJIYAMA, *foo je yah'mah*, or **FUSIYAMA**, the "Peerless Mountain" of Japan, whose snow-covered summit, bathed in clouds, is visible in clear air for a hundred miles. Fujiyama is a dormant, cone-shaped volcano. It is on the island of Hondo, sixty miles west of Tokyo, and is the highest summit in Japan, with an elevation of 12,400 feet. See illustration, article JAPAN.

FULLER, MARGARET. See OSSOLI, SARAH MARGARET FULLER.

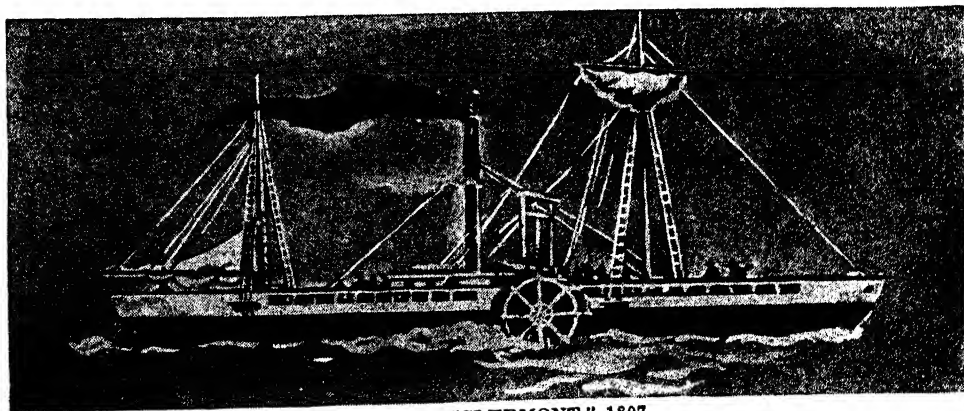
FULLER, MELVILLE WESTON (1833-1910), an American Chief Justice, was born in Augusta, Me. At the age of twenty he graduated at Bowdoin College. He studied law at Harvard and was admitted to the bar in his native city in 1855. He became editor of the *Augusta Age*, but in 1856 moved to Chicago, where he practiced law for thirty-two years. In 1862 he was a member of the Illinois constitutional convention, and the following year he was elected to the state legislature. He was a member of the Democratic national conventions from 1864 to 1880, inclusive, but withdrew from active politics in the latter year. On April 30, 1888, he was appointed Chief Justice of the United States Supreme Court by President Cleveland and served twenty-two years. In 1899 he was one of the arbitrators of the Anglo-Venezuelan dispute.

FULLER'S EARTH, a fine grained mineral substance, resembling clay. It is compact, but friable, and feels soapy to the touch. Silica, alumina, flourine, calcium and magnesia are among its constituent elements. It was formerly used by fullers as an absorbent of grease and oil in cloth, hence the name. Fuller's earth is to-day used chiefly in the filtration of mineral oils and for decolorizing certain vegetable oils. Formerly England was the chief source of supply for America, but within recent years deposits of this earth in Georgia and Florida have supplied the United States.

the shores of the Faroe Islands, Iceland, Greenland and around Saint Kilda, off the coast of Scotland. On the American coast it comes as far south as Massachusetts. It is about the size of a duck, is gray above and white beneath, with snow-white head, neck and tail. The birds are especially valuable for their feathers, and for their oil, which forms an important commercial product. Hunters make perilous descents by ropes from the summit of precipices to capture them. The giant fulmar, remarkable for its size, is found in the Pacific Ocean. Another species, the slender-billed fulmar, is found on the Alaskan coast of Bering Sea. See PETREL.

FULMINATION, a term used in chemistry to denote explosion of certain compounds by heat or percussion. *Fulminates* are explosive compounds consisting of fulminic acid and various bases, such as gold, mercury, platinum and silver. They are used as priming in percussion caps to cause the explosion of gunpowder in cartridges and shells.

FULTON, ROBERT (1765-1815), an American engineer, famed for his achievements in practical steam navigation. Though he was not the first to experiment with steam power (see FITCH, JOHN), he is honored as the inventor of the first successful steamboat. Fulton was born at Little Britain, Pa. He adopted the profession of portrait and landscape painter and in his twenty-second year proceeded to England for the purpose of studying art under West. There he became



FULTON'S "CLERMONT," 1807

FULMAR, the name of several species of petrels. The common northern fulmar inhabits the northern seas and is plentiful on

acquainted with Earl Stanhope and James Watt and was led to devote himself to mechanical engineering. In 1794 he took a

patent for a double-inclined plane, which was intended to supersede locks on canals, and he also patented a mill for sawing marble, machines for spinning flax and making ropes, and a dredging machine.

In 1797 he went to Paris, where he produced the first panorama that was exhibited there, and also devoted himself to the invention of torpedoes for naval warfare. He also was successful after a few trials in introducing a boat propelled by steam upon the Seine. During a visit to Scotland he had seen and obtained drawings of the *Charlotte Dundas*, a steam vessel which had plied with success on the Forth and Clyde Canal. Returning to America in 1806, he built a steamboat, the *Clermont*, of considerable dimensions, which began to navigate the Hudson River in 1807. Its progress through the water at the time was five miles an hour. His reputation as an engineer and inventor was now firmly established, and he was employed by the United States government on various engineering works. In 1814 he constructed the first war steamship and was engaged upon an improvement of his submarine torpedo when he died. See SHIP.

FUMIGATION, a method of disinfecting houses or garments by the use of fumes. Sulphur, formaldehyde and chlorine gas are among the agents employed, but formaldehyde solutions are the most desirable because they have no injurious effects on silver or other metals liable to tarnish. A room which is fumigated must be kept closed for six hours, after which it should be thoroughly ventilated and sunned. See FORMALDEHYDE.

FUNDY, BAY OF, a large inlet of the Atlantic Ocean, on the coast of North America, between Nova Scotia and New Brunswick. It is about 100 miles long and from thirty to fifty miles wide. At its inner extremity it divides into Chignecto Bay and Minas Channel and Basin. At its entrance are Grand Manan and other islands. This bay receives the Saint John and Saint Croix rivers. It is noted for its impetuous tides, which rush in with great force and have risen to a recorded height of 50¼ feet.

FUNGI, *fun' ji*, a general name for a class of parasitic plants which, having no chlorophyll (the green coloring matter by means of which plants assimilate atmospheric oxygen), must feed on other plants, or on animals, alive or dead. There are about 150,000 fungi, only a third of which have been de-

scribed. They may be roughly classified as belonging to two groups: the *saprophytic* fungi, which live on dead or decaying organisms; and *parasitic* fungi, which implant their suckers or roots into the cells of living plants and draw nourishment therefrom. Some are microscopic in size. They thrive wherever they can find substance,—in the air, in the soil, in exposed water. Some species are beneficial to man, but others are destructive.

Related Articles. Consult the following titles for additional information:

Bacteria and	Mushrooms
Bacteriology	Rusts
Mildews	Yeast

FUNGICIDES. See INSECTICIDES AND FUNGICIDES.

FUNNY BONE, the name ignorantly applied to the slightly-protected ulnar nerve in the arm, close to the humerus. A feeling similar to an electric thrill passes along the arm to the finger tips when the nerve receives a sudden blow.

FUNSTON, FREDERICK (1865–1917), an American soldier who became one of the Spanish-American War heroes through his capture of Aguinaldo. He was born at Carlisle, Ohio, was graduated from the high school at Iola, Kan., and after teaching a short time entered the state university at Lawrence. Having made important researches in botany, he was appointed in 1895 as a commissioner to explore Alaska and report on the flora of the country. In 1896 he took part with the insurgents in Cuba under General Garcia. When the Spanish-American War began Funston became colonel of the Twentieth Kansas Volunteers and was ordered to Manila. Soon he was made brigadier-general of volunteers for bravery, and in March, 1901, he led a party of soldiers into Northern Luzon and captured Aguinaldo, the leader of the insurgents. For this achievement President McKinley made him a brigadier-general in the regular army.

At the time of the San Francisco earthquake and fire in April, 1906, General Funston had charge of the military forces in the city. In 1914 he was in command of the United States troops at Vera Cruz, Mexico, and was made major-general the same year. In 1916 he was placed in command of the troops along the Mexican border, and in February, 1917, died suddenly in San Antonio, Tex. In the campaign last noted, General Pershing was second in command.



FUR-BEARING ANIMALS OF NORTH AMERICA

1. Brown Bear.
2. Squirrel.

3. Lynx.
4. Sable.

5. Seal.
6. Ermine.

7. Otter.
8. Beaver.

9. Silver Fox.
10. Mink.



Ermine (winter coat)

FUR AND FUR TRADE.

When mother or sister clothes herself in a garment of seal, sable or beaver she little realizes how severe has been the labor of man which makes such warm and beautiful clothing possible. The more precious the skin from which the coat is made, the greater has been the energy and the greater the suffering and endurance; for the finest

skins from which clothing is made come from the most northerly regions and are secured in the very coldest weather, in the silences of the trackless north.

Even under the Arctic Circle there are periods of comparative warmth; the hunter and trapper would like to hunt the fur animals then, but he knows that their summer coats are not so fine, the fur not so thick and the color in most cases not so desirable. When the cold is so intense as to be almost unbearable the little animals put on their warmest raiment; the fur is long and fine and soft and thick down is found close to their bodies. This extra covering adds value to the pelt. It is during this season that the trapper works hardest, seeking the otter, beaver, ermine, marten and sable, which are the rarest and most desired, and the mink, muskrat, fox bear, wolf, etc., which also yield him a good portion of his profit. The skin of the silver fox has become so rare and so valuable that to-day these little animals are raised on farms and a wonderfully profitable industry has been developed (see FUR-FARMING, below).

The hunters and trappers have little work to do in preparing their catch for the market. They stretch the skins upon boards to dry them thoroughly, after which they are shipped to the buyers. The fur dresser, on receiving the skins, softens them, scrapes off the pieces of flesh that may remain, and cleans them. Then, after the fur has been combed and the coarser hairs removed, the skin is ready for the cutters and the finishing tailors, who line them and produce the completed garments.

The warmer climates also produce some good furs of a less expensive variety. The ingenuity of man, too, makes it possible to

use the pelts of the commonest and most despised animals. These are employed in making imitations of the expensive skins, and uninformed people are not able always to detect the difference between the imitation and the real. For the cheaper grades the skins of moles, muskrats, skunks, cats, rabbits, squirrels and even rats are employed, as named below:

Trade Names. The following list gives some of the common substitutions, both true and trade names:

REAL NAME	TRADE NAME
House Cat	Genet
China Sheep (short hair)	Patagonian Bison
Coney	American
or Hudson Bay Sable; Electric or Near Seal	
Coney with black tips inserted	Ermine
Dog (Black Manchurian)	Chinese Wolf
Fox, White, dyed	
.....	Blue Fox (This is an imitation)
Fox, red, dyed black and pointed with white	
Badger hair	Pointed Fox
Goat	Bear or Blue Japanese Wolf
Hare	Black Lynx
Kid	Persian Lamb or Broadtail
Marmot	Brook Mink or Sable
Mink	Sable
Muskrat	Russian Otter, River Mink
Muskrat (with long hairs drawn)	
.....	Hudson, Red River or Aleutian Seal
Nutria or Coypu Rat (natural)	
.....	Beaver or Otter
Nutria (dyed and long hairs pulled)	
.....	Russian Otter, River Mink
Opossum (sheared and dyed)	
.....	Beaver, Skunk
Opossum, Australian	Adelaide Chinchilla
Otter (pulled and dyed)	Sea
Rabbit, according to process of preparation:	
Seal, Hudson Seal, Electric Seal, Cape Seal	
Ringtail Cat	Kolinsky
Sheep (dyed and acid curled)	Astrakhan
Skunk	Black Marten, Alaska Sable
Wallaby	Australian Fisher, Koala
Wolf, pointed with white badger hair	
.....	Pointed Wolf

Sea Animals. Reference thus far has been made to land animals only. The seal skin, for many years the royal fur for ladies' wraps, comes from the fur seal, a water animal, whose story is told in the article SEAL, subhead *Fur Seal*. The seal skin is not the most expensive skin. First place is held by the silver fox; the sable, too, used in the robes of kings and princes, is more expensive than the seal, for the sable is small and rare, and many pelts are required for a robe.

Commercial Centers. Each winter's catch of furs must reach markets as soon as pos-

sible. Before the days of land transportation, traders hauled their furs southward from the Pacific northwest and from Central Canada toward the headwaters of the Mississippi and Missouri rivers and their tributaries, and sent them down stream to Saint Louis. Thus that city early became the largest fur market of the western world. It retains this distinction today, though Chicago, New York, and Montreal are bidding for supremacy.

Fur Farming. To Mr. Charles Dalton and Mr. Robert T. Oulton of Prince Edward Island belongs the credit of being the successful pioneers in raising silver foxes in captivity and placing the industry on a successful commercial basis. They began their enterprise in 1887. By 1909 there were a number of farmers near Alberton raising foxes. Since then the industry has been developed in every Province of Canada, many States of the Union, and many foreign countries.

Canada has about 6,500 fur farms, rearing nearly thirty kinds of fur-bearing animals. There are nearly 500,000 animals, valued at more than \$16,000,000. The value of pelts sold averages \$3,000,000, and of animals sold over \$1,800,000.

In the United States, also, there are many "farms" for the rearing of fur-bearing animals in captivity.

Historical. The fur trade has given rise to several great trading companies. The French early took up the fur trade in Canada, and their chain of forts and trading posts at one time extended from Hudson Bay to New Orleans. Quebec and Montreal were at first trading posts. In 1670 Charles II granted to Prince Rupert and others a charter empowering them exclusively to trade with the Indians of the Hudson Bay region.

A company, then and after called the Hudson's Bay Company (which see), was formed, which for a period of nearly two centuries possessed a monopoly of the fur trade in the vast tract of country known as the Hudson Bay Territory. In the winter of 1783-1784 another company was formed at Montreal, called the Northwest Fur Company, which disputed the right of the Hudson's Bay Company and actively opposed it. After a long and bitter rivalry the two companies united in 1821, retaining the name of Hudson's Bay Company. The monopoly which had hitherto been enjoyed by the original company about Hudson Bay was not

much extended; but in 1868 an act of Parliament was passed to make provision for the surrender, upon certain terms, of all the territories belonging to the company and for their incorporation with the Dominion of Canada. In 1869 the surrender was carried out, Canada paying \$1,500,000 to the company by way of compensation.

The trade in furs conducted by citizens of the United States has been extensive, but it has been in a greater degree the result of individual enterprise than of the management of gigantic corporations.

In the Old World Russia and Siberia yield great quantities of furs, as do the Scandinavian countries. Southern Germany, the Balkan countries, Turkey and parts of Africa also produce many of the cheaper varieties.

FURIES, *fu'riz*, known also as the Eumenides or the Erinyes in Greek mythology, were representatives of the mighty powers in mythology who avenged such crimes as murder, perjury or filial ingratitude. It was generally believed that there were three of these goddesses, though Aeschylus in his tragedy of the *Eumenides* introduced fifteen. These terrible sisters pursued all criminals and drove them mad with remorse. So great was the fear of them that the ancients did not dare speak of them as the Erinyes, which meant the *angry goddesses*, but used the name *Eumenides* (gracious ones), in order to propitiate them.

FURLONG (furrow-length), an English measure of length, divided into 40 rods, poles or perches, and equal to 220 yards, the eighth part of a mile. The word is little used in America.

FURNACE, *fur'nase*, a device for heating dwelling houses, churches and other buildings, and for developing heat to be used in smelting ore, making glass, baking pottery and heating boilers, and other purposes. The ordinary furnace is an enclosure of brick, earthenware, metal or other material, in which is burned coal, coke, oil, or gas. Those employed in smelting have an arrangement by which a strong draft of air is forced through the fire; these furnaces are known as blast furnaces (see BLAST FURNACE). A *reverberatory* furnace is one in which the flames, in passing to the chimney, are thrown down by a low arched roof upon the object which it is intended to heat. These furnaces are used in the manufacture of wrought iron and steel (see IRON). A modern develop-

ment of furnace making is the electric furnace, which generates a heat so intense that it can produce carborundum, the hardest manufactured substance known. The ordinary furnace used for warming buildings is practically a large stove, enclosed in a jacket. The air is admitted to the jacket near the ground, and as it rises is warmed by coming in contact with the furnace. It passes out through pipes at the top and is conveyed to different parts of the building.

For small homes the pipeless furnace has been found very practicable and economical. The furnace is placed directly beneath the center of the house, and the furnace casing is run straight up to a large register directly above. In the early days of furnaces, and continuing until very recent years, coal or coke provided all the furnace fuel. Today, crude oil or gas is largely superseding these in city homes. The cost of heating is greater, but there are compensating advantages. (See HEATING AND VENTILATION.)

FURNESS, HORACE HOWARD (1833-1912), an American Shakespearean scholar. He was born in Philadelphia, and was educated at Harvard College and at Halle in Germany. After studying law he was admitted to the bar in 1859. The work, however, which gained for him a prominent place in American letters is the *Variorum Shakespeare*, a work which he left unfinished, but which was continued by his son, Horace Howard Furness, Jr. Furness received honorary degrees from Harvard, Yale and Columbia universities, and was made a member of the American Academy of Arts and Letters. One of his sons is William Henry Furness, 3d, ethnologist and author.

FURNITURE. People of the modern age use a far greater variety of household articles than did their ancestors. In ancient times and during the Middle Ages a house was considered furnished if it contained chairs, a couch, beds and something which served for a table. Even the nobility of medieval Europe lived in castles that would seem very dismal and bare to one accustomed to the comforts of a well-appointed modern home. Simplicity in furnishing the house still prevails in Japan, where screens, mats and pictures are the chief articles of furniture, but in Europe and the Americas the reverse is true.

Interest in beautiful furniture was awakened in Europe during the Renaissance, and

in France, Italy and England cabinetmaking developed as one of the fine arts. England produced, during the period of the four Georges (1715-1830), three masters of furniture designing—Thomas Chippendale, George Heppelwhite and Thomas Sheraton. Chippendale's name is associated with chairs having curved (cabriole) legs and lattice-work backs of the most exquisite design; and with china cabinets, bookcases with glass fronts, writing desks with glazed doors, and elaborately decorated settees. The sideboard of the modern English type is the creation of Heppelwhite, and he was especially skilled in the use of inlay and veneers. The special contribution of Sheraton was hand-painted furniture. He produced some of the most beautiful boudoir furniture of his time.

Styles in furniture change with human caprice. Not many years ago furniture of former "periods" in Europe revived interest in "Queen Anne" dining sets and "Georgian" chairs. That vogue persists, but was largely succeeded by heavy "Mission" pieces, dull-finished. Today the trend is toward what is termed "modernistic," unusual forms in which bright metal has an important place. However, the English masters named above will continue to hold their vogue with the well-to-do.

The United States is one of the leading furniture-manufacturing countries, with a yearly output valued at about \$265,000,000. To American ingenuity are due the rocking chair, the folding bed and the chiffonier. New York produces more furniture than any other American city; Chicago is second, and Grand Rapids (Mich.) is third, in production; the last-named was once first.

FUR SEAL. See SEAL, subhead *The Fur Seal*.

FUSE, *fewz*, a device for igniting explosives or other combustible mass, slowly and without danger to the person lighting it. Fuses are used in blasting and in discharging bombs. In blasting, the fuse is either a tape or cord saturated with some inflammable compound or a tubular cord containing in its center a small quantity of gun powder or other combustible material. In blasting operations to-day the explosive is usually ignited by means of electricity. Several sorts of fuses are used for explosive shells, or bombs. A *concussion* fuse is one that is ignited by the shock caused when the projectile strikes; a *percussion* fuse is ignited

by the impact of the blow when the bomb hits. Quite different from these two types of fuse is the time fuse, a mechanical fuse which is timed to produce an explosion at the end of the number of seconds or minutes it is estimated it will take the shell to reach the object against which it is fired.

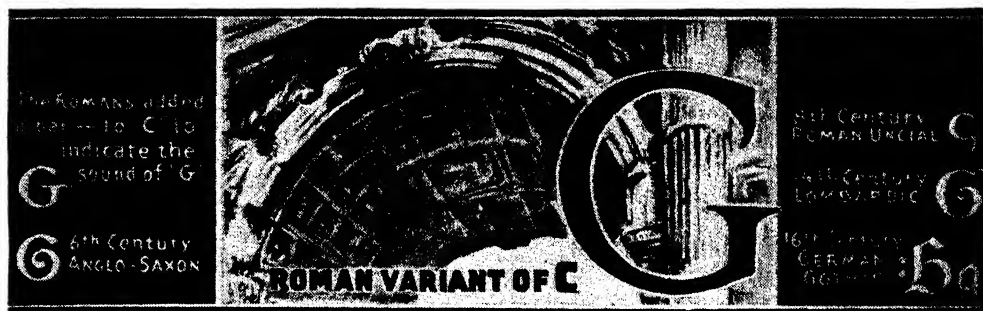
FU'SEL OIL, an oily impurity frequently found in spirits distilled from fermented barley, rye, potatoes, beet root, malt and other substances. It is much more intoxicating in its effect than ordinary alcohol, and is poisonous. Fusel oil can be removed from alcohol by filtration through charcoal, by distillation, or by a combination of the two processes. The oil is about six times as valuable as the alcohol from which it is isolated. It is used in preparing artificial fruit essences and in the manufacture of alkaloids.

FUSING, *fuzé'ing*, **POINT**, the degree of temperature at which a substance melts or becomes fluid. This point is very different

for different substances. Potassium fuses at 136° F., bismuth at 504°, lead at 619°, zinc at 680°, silver at 1832°, gold at 2282°. Malleable iron requires the highest heat of a smith's forge, 2912°; while cerium, platinum and some other metals are infusible in the heat of a smith's forge, but are fusible before the oxy-hydrogen blow pipe and in the electric furnace.

FUSION, *fu'zhun*, in science is another term for melting. The fusing point for a solid substance is that temperature at which it becomes liquid. That for ice is 32° F., and that for platinum is 3231° F. Solidified mercury melts at a temperature of -40° F. Metallic mixtures capable of being melted are known as *fusible metals*.

In politics the term is applied to the union of two or more political parties in an election. Fusion is employed, for example, when two parties unite on a single candidate in order to insure the defeat of a third-party candidate.



G, the seventh letter in the English alphabet. The Roman alphabet originally contained no such character, the hard *c* sound serving where the *g* came to be used later. *G* always has the hard sound, which is its earliest sound, at the beginning of words of English origin, before the vowels *a*, *o* and *u* and at the end of a word. The soft sound, which is identical with that of *j*, is found usually before *e*, *i* and *y*. In form, also, *G* is a modification of *C*.

In music, *G* is the fifth note of the diatonic scale of *C*.

GABERS, *ga'burz*. See **GHEBERS**.

GABLE, the triangular part of an outside wall at the end of a building, extending from the eaves to the ridge of the roof. It did not come into general use until the Romanesque period of architecture in the Middle Ages, when it was common in the formation of the summits of church façades. It was also used as a decorative feature in the architecture of residences. The development of tracery in Gothic architecture led to the use of highly decorated gables as ornaments over doorways, windows, pinnacles and other parts of buildings. In the towns of Belgium and Germany to-day ornamental gables are in use in houses to a great extent.

GA'BRIEL, the name given to that one of the archangels whose duty it was to announce to man the will and purpose of God. He appeared to Daniel as the interpreter of a vision, *Daniel* VIII, 7; to Zacharias as the herald of the birth of John the Baptist, *Luke* I, 19, and to Mary as the herald of the birth of Christ, *Luke* I, 26.

GAD'FLY, or **HORSE FLY**, the name given to over a thousand different species of small flies which are troublesome pests in the woods during the summer months, particularly near water, for they are great drinkers, as a rule. The common black gad-

fly, which is found in many parts of the United States and Canada, sucks the blood of man and other animals through its sharp proboscis and, if permitted, will lay its eggs in the wound, producing sores.

GADS'DEN, ALA., the county seat of Etowah County, fifty-six miles northeast of Birmingham, on the Coosa River and on the Louisville & Nashville, the Southern, and three lesser railroads. There is an airport. The surrounding region is rich in minerals and timber. The industries include blast-furnaces and the manufacture of cars, lumber, machinery, furniture, overalls, and ribbon. There are three parks and a civic auditorium. It was settled about 1845 and incorporated in 1867. There is a Federal building. Population, 1920, 14,737; in 1930, 24,042.

GADSDEN PURCHASE, the name given to a tract of land in the southern part of New Mexico and Arizona, purchased from Mexico by the United States in 1854, through the agency of James Gadsden, United States minister to Mexico. It is bounded on the north by the Gila River, on the east by the Rio Grande, on the west by the Colorado and on the south by an arbitrary line. Its purchase settled a boundary dispute which had resulted from the Mexican War (which see). The average width of the territory purchased is about 120 miles, and it includes an area of about 45,535 square miles. The United States paid Mexico \$10,000,000. The treaty was negotiated in 1853 and was ratified in the following year. It caused such opposition in Mexico that Santa Anna was banished.

GADSKI, *gaht'ski*, JOHANNA (1871-1932), a German dramatic soprano of the first order. She was born and educated in Prussia, and made her début in Berlin at the age of seventeen. Four years later she married

Herr H. Tauscher, an officer in the Austrian army. Her American début was made in 1895, at the Metropolitan Opera House, New York City, under the management of Walter Damrosch. In 1898 she became a member of the Metropolitan Opera Company, and has since enjoyed a popularity equaled by that of few other singers. Her beauty, dramatic talent and superb vocal gifts made her a commanding figure in the musical world. As an interpreter of Wagner rôles she had no superior.

GADWALL, a rather large fresh-water duck, common in the interior of the United States and breeding north of the latitude of Kentucky. It is a black and white duck, marked with brown, and is one of the favorite game birds.

GAEL, *gale*, the name of a branch of the Celtic peoples, now represented by the native inhabitants of the Isle of Man, the Scottish Highlands and Ireland. Each of these groups has its own Gaelic dialect. Manx, the Gaelic speech of the Isle of Man, is taught in the schools along with English, and the Scottish Gaelic dialect has never died out among the sturdy Highlanders. It is in Ireland, however, that Gaelic has had its most remarkable revival. Because of severe restrictive laws enacted after the conquest of the island by Cromwell, Irish as a spoken tongue survived only in the remote sections of the western coast. Through the efforts of the Gaelic League, founded in 1893 to preserve and develop the native Irish language and literature, Gaelic enjoyed a rebirth, and after the establishment of the Irish Free State, it was adopted as the official language. English, however, is still spoken generally by the people of Ireland.

GAGE. See **GAUGE**.

GAGE, THOMAS (1721-1787), an English soldier and colonial governor of Massachusetts, born in Sussex, England. At the outbreak of the last French and Indian War, he was made brigadier-general and served at the head of a regiment of colonial troops. He was governor of Montreal in 1760, became major-general in the following year and at the end of the war was commander in chief of the British forces in America. In 1768 he was placed at the head of a British force in Boston, but returned to England in 1772. Two years later he was appointed military governor of Massachusetts and aroused bitter resentment by his vigorous enforcement of

the Boston Port Bill and the Navigation acts. It was through his order to the troops to seize the military stores at Concord that the first battle of the Revolutionary War was fought. He commanded the troops at Bunker Hill, but was recalled to England in October, 1775.

GAINSBOROUGH, *gayns'b'ro*, **THOMAS** (1727-1788), an English painter, born at Sudbury, in Suffolk. He was one of the original thirty-six academicians. He rivaled Sir Joshua Reynolds as a portrait painter and showed no less originality in landscape. He painted portraits of Garrick, Mrs. Siddons, Pitt, Blackstone, Burke and many other notable people. One of his most celebrated productions is *Duchess of Devonshire*, which was bought originally for \$305, but sold for more than \$50,000 in 1876. Other paintings are *Blue Boy*, considered his greatest work, *Rustic Children*, *The Cottage Door* and *The Harvest Wagon*.

GAL'AHAD, **SIR**, in legends of the Holy Grail, the son of Launcelot and Elaine, the purest of the knights of the Round Table. He figures prominently in the quest of the Grail, though there are varying accounts of the legend, such as that given by Tennyson in the *Idylls of the King*, and the version of Sir Thomas Malory. The English painter Watts executed a beautiful painting of Sir Galahad in armor, his model being his wife, Ellen Terry. See **GRAIL**, **THE HOLY**.

GALAPAGOS, *gah lah'pah gohs*, a group of thirteen volcanic islands in the North Pacific Ocean, about 600 miles west of Ecuador, to which they belong. Their area is slightly more than 2,000 square miles; the population is about 500. The islands are not notable for their economic products nor for their scenery, though some mountains rise nearly a mile above sea level. They are of surpassing interest to scientists, however, for here are found animals unknown elsewhere in the world. Charles Darwin in 1858 made these facts known to the world. Gigantic turtles probably excite the greatest interest of visitors.

GALATE'A. See **PYGMALION**.

GALATIA, *ga la'she ah*, the ancient name of an extensive region in Asia Minor, so called from its Gallic inhabitants, who settled there in the third century B. C. These were compelled by Attalus, king of Pergamos, to settle within well-defined limits. Galatia became a Roman province under Augustus and

was divided into provinces by Theodosius. It was twice visited by the Apostle Paul, who later addressed one of his famous letters to the people of Christian churches in the region. It forms the ninth book of the New Testament.

Epistle to the Galatians, a letter of the New Testament, written by Paul to Galatian churches, to warn them against those who were trying to influence them to adopt Jewish rites and to defend himself from the unjust criticisms being made. The letter is claimed by some to be earlier than those to the Thessalonians.

GAL'AXY. See MILKY WAY.

GAL'BA, **SERVIVS SULPICIUS** (3 B. C.—A. D. 69), a Roman emperor. He served as general in Germany and as proconsul to Africa, his services there obtaining him the honors of a triumph. He then lived in retirement till the middle of Nero's reign, when the emperor appointed him governor in Spain. Soon afterward, however, Nero secretly ordered Galba to be assassinated. Galba revolted, and on the death of Nero he himself was chosen emperor by the praetorian guards in Rome. He went directly to Rome, but soon made himself unpopular by cruelty and avarice, and was slain in the Forum.

GALE, ZONA (1874—), a novelist, poet, and dramatist, born in Wisconsin, which state has honored her with important educational posts. From 1923 to 1929 she served as a member of the board of regents of the University of Wisconsin, from which she had been graduated in 1895, and afterward became a member of the state library commission. She began her public work as a reporter for a daily newspaper in Milwaukee, and went from there to New York, where she was on the staff of the *World*, doing miscellaneous writing at the same time. She then returned to her native state (1904) and began the literary career that won acclaim. In 1928 she was married to William L. Breese, a banker of Portage, Wis. She is interested in politics as a liberal.

Miss Gale received the Pulitzer Prize (1921) for her dramatization of *Miss Lulu Bett*, which she published in 1920; in 1924 her dramatization of *Birth* appeared as *Mr. Pitt*; other plays were *The Neighbors* and *Uncle Jimmy*, each in one act. Her novels, in addition to the two named above, number more than a dozen; among those of most importance are *Mothers to Men*, *When I*

Was a Little Girl, *Peace in Friendship Village*, *Faint Perfume*, *Yellow Gentians and Blue*, *Borgia*, *Bridal Pond*, *Old-Fashioned Tales*, and *Papa Le Fleur*.

GALEN, properly Claudius Galenus, (A. D. 130–200), a Greek physician, the world's supreme medical authority until about 1550. Among the many writings attributed to Galen are eighty-three treatises acknowledged to be genuine. The most valuable of his works were those dealing with anatomy and physiology, and he was the first to establish the consultation of the pulse in determining the nature of disease.

GALENA, or **LEAD GLANCE**, a widely-distributed mineral ore which is the chief source of lead. It contains about eighty-seven parts lead to thirteen of sulphur and some silver, antimony, zinc, iron and bismuth. Where the proportion of silver is high the ore is known as *argentiferous galena*, and it is worked with a view to extracting this metal. All galena is soft and brittle, with a bluish-gray luster, and is very heavy. It is usually found in caves or gash veins of limestone. In the United States it occurs in Illinois, Colorado, Idaho and Montana, and in smaller quantities in Iowa, Missouri and Wisconsin. See **LEAD**.

GALENA, **ILL.**, the county seat of Jo Daviess County, seventeen miles southeast of Dubuque, Ia., on the Galena River and on the Illinois Central, the Chicago & Northwestern and Chicago, Burlington & Quincy railroads. Galena is well known for its part in the early history of the Middle West. It became the center of extensive lead and zinc industries, and was the home of General Grant in early manhood; his old home is yet here. The city contains a Federal building, a public library and Grant Park, with a statue of the general. The town was settled in 1827, and was chartered as a city in 1839. Population, 1930, 3,878.

GALESBURG, *gayls'burg*, **ILL.**, the county seat of Knox County, 163 miles southwest of Chicago, on the Atchison, Topeka & Santa Fé and the Chicago, Burlington & Quincy railroads. An airport adjoins the city. The city has an attractive location and is the seat of Knox College, Saint Joseph's Academy and Saint Mary's Academy, and has a Carnegie Library, a state armory, an opera house, a Y. M. C. A. and a Federal building. There are five parks and nearly twenty playgrounds. The industrial establishments in-

clude railroad shops of the Chicago, Burlington, & Quincy Railroad, stockyards, brickyards and manufactures of engines and agricultural implements. The place was settled in 1834 by New Yorkers and was named in honor of Rev. George W. Gale, who planned the town as the site for a theological seminary and a rallying ground for the "Free-Soilers" of the territory. Population, 1930, 28,830.

GALICIA, *galish'i a*, a province of the former Austro-Hungarian monarchy, occupying the northeastern part of that country. Czechoslovakia is on the south, Poland on the north, the Ukraine on the east, and the province of Silesia on the narrow western border. Galicia, now in Poland, covers 30,308 square miles.

On the dissolution of Austria-Hungary, in the fall of 1918, Eastern Galicia, in which Ruthenians are the dominant element in the population, formed a separate state and joined the Ukraine. Western Galicia, which is dominated by Poles, formed an independent Polish state and united with the Russian Poles on the north. The Poles endeavored to prevent the secession of the Ruthenians, and the result was a protracted period of fighting, complicated by efforts of the Bolsheviks to gain control of affairs. In the end, Galicia became a very important part of the Polish Republic.

The population was originally Germanic, but the German tribes were driven out by Poles and Ruthenians. Dissensions opened the way for the conquest of the district by the Hungarians, and later, the Russians. In 1340 Poland possessed the country, and it formed a part of that country until its partition in 1772. In that year it was annexed to Austria. Since then racial quarrels have frequently disturbed the section. The inhabitants, who are Russians, Poles, Slovaks, Bohemians and Ruthenians, did not accept kindly the rule of the empire, but Galicia shared more fully in its own government than did any other Austrian province under the existing rule.

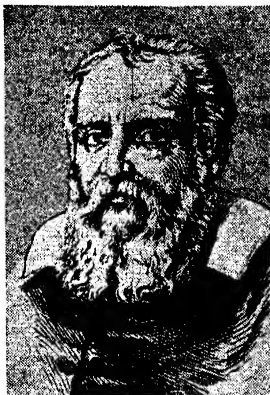
GAL'ILEE, in the time of Jesus Christ the most northern province of Palestine, bounded on the east by the river Jordan, on the south by Samaria, on the west by the Mediterranean Sea and Phoenicia and on the north by Syria and the Mountains of Lebanon. It was in a sense the cradle of Christianity. Nazareth, Cana, Capernaum,

Nain and other places being intimately associated with the life of Christ. The inhabitants of this country, mostly poor fishermen, on account of their ignorance and simplicity of manners were despised by the Jews, who, by way of contempt, called Christians, at first, *Galileans*. Galilee is again a part of Palestine, since its organization as a state. See PALESTINE.

GAL'ILEE, SEA OF, anciently known as the LAKE OF GENNESARET, is an inland body of water in Central Palestine which will forever retain special religious associations. It is thirteen miles long and seven miles wide, is 682 feet below the surface of the Mediterranean Sea, and is traversed in its upper course by the River Jordan. It was known for a time as the Sea of Tiberias, after the building of the city of Tiberias on its shores. In the vicinity of this sea, particularly at the north, much of the public life of Christ was spent, and in his time there were nine prosperous cities on its shores. Seven of these have disappeared; Magdala and Tiberias, the other two, are now poor, crumbling villages.

GALILE'O (1564-1642), the popular name of GALILEO GALILEI, a most distinguished Italian philosopher and astronomer, born at Pisa and educated at its university. He was one of the great creators of experimental science. When he was nineteen years of age, the swinging of a lamp in Pisa cathedral led him to investigate the laws of the oscillation of the pendulum, which he subsequently applied in the measurement of time, and in 1586 the works of Archimedes suggested his invention of the hydrostatic balance. He later devoted his attention exclusively to mathematics and natural science and was made professor of mathematics at the University of Pisa and later held the same position in Padua, where he remained eighteen years. His lectures there acquired European fame; there he made the important discovery of the law regulating the motion of falling bodies. If he did not invent, he improved, the thermometer and made some interesting observations on the magnet. His most remarkable discovery was that of Jupiter's satellites, and he observed, though imperfectly, the rings of Saturn. He also detected the sun's spots and inferred, from their regular advance from east to west, the rotation of the sun and the inclination of its axis to the plane of the ecliptic. In 1610 Cosmo II,

grand duke of Tuscany, appointed him grand-ducal mathematician and philosopher, and he lived sometimes in Florence and sometimes at the country seat of a friend, where he discovered the varying phases of Mercury, Venus and Mars. In 1611 he visited Rome for the first time, and was treated with great distinction. Four



GALILEO

years later he again visited Rome, but this time was not so warmly received, as in the meantime he had published his work on the solar spots, in which he had advocated the Copernican system, in spite of the hostility of the churchmen. He was, in consequence, denounced as a propounder of heretical views. Some time afterward he wrote his most famous work and received Papal permission to publish it, but hardly had it been issued, when Pope Urban VIII, having been led to believe that Galileo had satirized him in this work, summoned him to Rome in 1623 to be tried by the Holy Office. Several writers asserted that Galileo was imprisoned for heresy; but most modern authors agree that although a sentence of imprisonment was pronounced upon him it was never enforced. His remains were buried in France.

GALL, gahl, FRANZ JOSEPH (1758-1828), the founder of phrenology, was born in Tiefenbrunn, Baden. He studied medicine and practiced at Vienna as a physician, where he made himself favorably known. After a series of comparisons of the skulls of men and animals, he was able to assign the particular location of twenty organs. He accompanied Dr. Spurzheim, to Paris, in 1807 where he published with Spurzheim, in 1810 and 1812, several books on the nervous system. See PHRENOLOGY.

GALLATIN, ALBERT (1761-1849), an American statesman and financier, born in Geneva, Switzerland. He received a thorough education in his native land and then emigrated to the United States, arriving in 1780. He entered business, but without suc-

cess, was instructor in Harvard College for a time and then removed to Pennsylvania. There he became prominent as an earnest opponent of the Federal Constitution and served as an Anti-Federalist in the state legislature in 1793. He was elected to the United States Senate, but was forced to withdraw because he had not lived the requisite time in the United States. He labored earnestly to suppress the Whisky Insurrection. In 1795 Gallatin entered Congress, becoming a leader of the Republican party, and displaying preëminent ability as a judge of financial measures. Jefferson made him secretary of the Treasury in 1801. During his term he carried out Hamilton's policy, but instituted original reforms which decreased the national debt and placed the finances of the nation on a safe basis. He strongly opposed the War of 1812, labored earnestly to bring about peace and was a leading negotiator in the Treaty of Ghent. He then accepted the office of minister to France, which he filled until 1823. Three years later President Adams appointed him as minister to England, but after two years he resigned.

GALL, gawl, **BLADDER**, a pear-shaped sac, attached to the under side of the liver. It serves as a storehouse for the bile. The neck of this sac is connected with a tube called the *cystic duct*, which combines with the *hepatic duct* to form the common *bile duct*. During the interval between meals, the bile, which is continually being secreted by the liver, passes into the common bile duct to find the opening into the duodenum closed by its sphincter muscle; it is therefore forced into the gall bladder through the cystic duct, which has an opening into the common duct. It remains in the gall bladder till food enters the small intestines. By some reflex movement the bile is then discharged with force enough to open the sphincter. Gall stones are small, hard masses which sometimes form inside the gall bladder. When they pass through the bile duct into the intestine they cause agonizing pain. The condition sometimes requires an operation. See BILE.

GALLEY, a low, flat-built vessel, with one deck, once commonly used in the Mediterranean. It was navigated with sails and oars. The common galleys varied from 100 to 200 feet in length, those of smaller sizes known respectively as half-galleys and quar-

ter-galleys. The larger ones carried as many as twenty oars on each side, each oar worked by one or more men, and they had commonly two masts and sails. These, however, were more fully developed in the kind of galley known as the *galleass*, which carried three masts, from 200 to 300 rowers and sometimes twenty guns. France formerly had a number of galleys for service in the Mediterranean, in which convicts were forced to labor, from which came the term *galley slave*. The ancient Greek and Roman warships, propelled by two or three banks of oars, are also known as galleys. See **TRIEMES**.

GALLI-CURCI, *gahl'e-koor'che*, AMELITA (1889-), an operatic soprano who, at the height of her career, was considered the successor of Adelina Patti. She was born in Milan, Italy, of Italian and Spanish parentage. A student of piano and later a teacher at the Royal Conservatory of Milan, she became a singer when she realized the possibilities of her fine soprano voice. Self-taught, she had a triumphal début in Rome as Gilda in *Rigoletto* in 1909. She made her American début in 1916, and for years her flute-like voice, with its range of three octaves, captivated patrons of the leading American opera companies. In 1930 her voice became affected by a goiter. After a period of retirement, Galli-Curci again appeared in opera in 1936, but she was not the great coloratura soprano of her best years. She divorced her first husband, Luigi Curci, in 1920, and in 1921 married her accompanist, Homer Samuels.

GALLINULE, a name for certain water birds belonging to the rail family. Though not web-footed, they are good swimmers, for their toes are furnished with a narrow membrane. There are two American species. These are the *purple gallinule*, a bird of the Southern states, and the *Florida gallinule*, which ranges from Ontario to Brazil.

GALLIPOLI, *gal'ip'o le*, a peninsula and town on the European side of the Dardanelles. The town (population 20,000) is relatively unimportant, except that Turkey used it as a base for its fleet. The peninsula guards the Dardanelles and has been the scene of battles and sieges. It was the gateway of the Turks when they entered Europe in 1357; the allied forces landed there in the Crimean War in 1854, and in 1915-1916 the entente allies in the World War were defeated at Gallipoli in their effort

to conquer the Dardanelles and open the way for the capture of Constantinople. See **WORLD WAR**; **DARDANELLES**.

GALLIUM, *gal'i um*, a metallic chemical element, discovered by means of the spectroscope in 1875 by a Frenchman named De Boisbaudran. It was found in zinc ore from Pierrefitte, in the Pyrenees and was named after Gallia, the ancient name of Gaul. It is of grayish-white color, has a brilliant luster, and is melted by the mere warmth of the hands into a silvery-white liquid. Its general properties resemble those of aluminum.

GALLON, a unit of capacity in the English system of weights and measures, used chiefly for measuring liquids. It contains 231 cubic inches, being equal to a cylinder 7 inches in diameter and 6 inches high. It is equivalent to 3.7853 liters. In England an *imperial gallon* is also used, containing 277.274 cubic inches. A gallon is divided into 4 quarts, each quart into 2 pints and each pint into 4 gills. See **WEIGHTS AND MEASURES**.

GALLS, *gawlz*, unnatural growths on plants, usually caused by the presence of the young of insects. Occasionally galls are produced by fungoid growths, worms, bacteria, algae or slime molds. Important among the gall-producing insects are the Hessian fly, which is a destructive pest of North American wheat; the phylloxera, which attacks the grape vine; the clover-seed midge, and the gall-fly. The female of the latter deposits her eggs in the leaves and twigs of various plants, but when the young hatch in the tissue of the oak tree there are formed the galls of commerce, the white, green or blue "oak apples." These galls contain gallic acid, used in the textile and dyeing industries, in photography and in medicine as an astringent. Galls of this class used by American manufacturers are imported chiefly from China (see **DYEING**). Modern writing ink has as one of its ingredients an infusion of bruised galls (see **INK**).

GALSWORTHY, JOHN (1867-1933), an English novelist and playwright, outstanding figure in modern literature. He was educated for the law and was called to the bar in 1890, but abandoned the legal profession for writing. His finished style, one of the most distinguished in English fiction, was the result of long and painstaking practice. He had become known as the author of bitter, starkly realistic plays dealing with social

conditions before he gained recognition as one of the greatest novelists of his time. Fame arrived in 1922 with *The Forsyte Saga*, a trilogy of a typical English family which has more the realism of biography than the imagination of fiction. A second trilogy, carrying the saga of the Forsytes to the fourth generation, was completed in 1928 (*The White Monkey, The Silver Spoon and Swan Song*). This was followed by another group of three novels, *Maid in Waiting, Flowering Wilderness and One More River*, showing no lessening of the author's ripened powers. Galsworthy's plays include *Justice, Joy, Strife, The Silver Box and Old English*. In 1932 he received the Nobel prize for literature.

GALT, ALEXANDER TILLOCH, Sir (1817-1893), a Canadian statesman. He was born in London, but emigrated to Canada at the age of eighteen. He entered the Canadian Assembly in 1849 as Liberal member for Sherbrooke County, Quebec, but he opposed the rebellion losses bill, the chief measure of his party. He retired from the Assembly, before the end of the year, but reentered it in 1853 and for twenty years was the leading representative of the English Protestants of Quebec. In 1858 he was called on to form a Ministry but declined. From 1858 to 1862 and again from 1864 to 1867 as Minister of Finance he did much to reduce the chaotic finances of Canada to order. To him are due the introduction of the decimal system of currency and the system of protection to Canadian manufacturers. He was one of the men whose influence led to the coalition Ministry of 1864-67. He became Minister of Finance in the first Dominion Ministry, but resigned after a few months. In 1877 he rendered brilliant service as Canadian representative on the Anglo-American Fisheries Commission at Halifax. He was Canadian high commissioner to Great Britain, 1880-1883.

GALT, ONT., in Waterloo County, on the Canadian Pacific and Canadian National railways, thirteen miles from Kitchener, fifteen miles from Brantford. Electric lines connect it with neighboring towns. The vicinity supplies large quantities of lumber, limestone and sand. The principal products of the city's factories are edged tools, knitted goods, safes, boots and shoes, farm implements, builders' supplies, and leather goods. Population, 1931, 14,006.

GALTON, gaw'ton, SIR FRANCIS (1822-1911), an English scientist, the cousin of Charles Darwin. He was born at Duddleston, Warwickshire, and educated at King's College, London, and Trinity College, Cambridge. His extensive travels in Africa led to works on the topography of Southwest Africa, and he published also *Meteorographica*, studies in meteorology which introduced the system of charting the weather which remains in use to-day. Most important of Galton's contributions to science, however, were his studies in heredity. He sought for the principles governing the inheritance of physical and mental traits, and founded the science which deals with the possibility of improving the hereditary qualities of the human race. To this new science he gave the name of *eugenics*, which means "well born." His works treating of this subject include *Hereditary Genius* and *Natural Inheritance*. See **EUGENICS**.

GALVANI, gal vah'ne, LUIGI (1737-1798), an Italian physiologist and physicist, who discovered galvanism, so named in his honor. He was born at Bologna, and in 1765 was appointed professor of anatomy in the University there. In 1797 he was deprived of the chair for refusing to take the oath of allegiance to the Cisalpine republic, but was reinstated after a few months. Although he gained repute as an anatomist, his fame rests chiefly on his discoveries of the relation of electricity to animal functions, discoveries which started with the observation of the convulsive movement of some dissected frog legs in contact with an electrically charged scalpel. After a prolonged series of experiments he published the results of his findings in 1791. See **ELECTRIC BATTERY**; **GALVINISM**.

GALVANIC BATTERY. See **ELECTRIC BATTERY**.

GALVANISM, a term formerly applied to current electricity, especially that arising from chemical action, as distinguished from that generated by heat or induction. The term is no longer in scientific use. See **GALVANI, LUIGI**; **ELECTRICITY**.

GALVANIZED IRON, a name given to sheets of iron coated with zinc. The iron is first cleansed by friction and the action of dilute sulphuric acid, and is then plunged into a bath, composed of melted zinc and sal-ammoniac. As the zinc cools, it forms in crystals on the surface, and this gives to galvanized iron its mottled appearance. So

long as the coating is entire, and is not exposed to corrosive substances, galvanized iron is very durable. It is used for making cornices, jackets for furnaces, vessels for holding water, and occasionally as a roofing material. Drinking water should not be kept in galvanized iron vessels, because the zinc dissolves and poisons the water.

GALVANOMETER, an instrument for measuring the strength of small electric currents. All galvanometers work on the principle that an electric current sets up a magnetic field about its conductor. One type has a compass needle delicately suspended within a coil while the other has a delicate coil suspended between the poles of a permanent magnet. A current sent through the coil of either type causes the movable part to swing to right or left according to the current direction. The strength of the current is estimated from the number of degrees through which the needle or coil swings.

GALVESTON, TEX., the county seat of Galveston County, on an island of the same name at the mouth of Galveston Bay, and on the Southern Pacific, the Gulf, Colorado & Santa Fé, the Missouri, Kansas & Texas and other railroads; there are also regular steamship lines to American coast cities and to all important foreign countries, and an electric road to Houston. It has wonderful palm trees and is world famous for its great sea wall. The city is the seat of the state university medical department, a Jesuit college, a Dominican convent and an Ursuline convent. The Ball High School is one of the greatest in the south. Prominent among semi-educational institutions is the Rosenberg Library which cost \$150,000 and has an endowment of \$400,000. Other important structures are the Sealy Hospital, the courthouse, the custom house and post office, the railroad station, the Y. M. C. A. building and the Buccaneer Hotel. Among other buildings may be mentioned the American National Insurance Building, the tallest building in the city. The Hotel Galvez, on the shore of the Gulf, is the finest resort hotel in Texas and one of the finest in the United States.

Among the industrial establishments are ice-plants, iron works, cottonseed oil mills, rice and flour mills and manufactories of cement, pipe, clothing, flour and various foods. The channel between the island and the mainland has been so improved by the

Federal government that it now affords an entrance of twenty-eight feet of water into an excellent harbor, with a wharf frontage of several miles. A magnificent causeway connects the island with the mainland. In 1919 the government established at Galveston a permanent hydroplane training station, to be housed in ten buildings, whose construction entailed an expenditure of \$2,000,000. The personnel exceeds 800 officers and men.

The city has long occupied first place in exporting cotton, but some of its commerce was lost to Houston upon the completion of its ship canal, which made it a seaport. Other foreign exports are cottonseed oil, wheat, copper, iron ores, cattle and provisions.

The first permanent settlement was made here in 1837 and incorporation followed two years later. The city suffered from a big fire in 1885. In 1900 it was the scene of a terrible disaster from a hurricane, originating in the West Indies. About \$18,000,000 worth of property was destroyed and about 6,000 lives were lost in the city and adjacent country. The city is now protected by a sea wall, completed in 1904, which forms the greatest structure of the kind in the world. It is 27,800 feet long, sixteen feet wide at the base and five feet at the top, and stands seventeen feet above mean low tide. Just after the great storm of 1900, this city originated and adopted the commission form of government, called at the time the Galveston Plan. Population, 1920, 44,255; in 1930, 52,938, a gain of 19.6 per cent.

GAMA, *gah'mah*, Vasco Da (1469-1524), the first mariner to sail around the Cape of Good Hope, and the discoverer of the sea route to India. He was born of a noble Portuguese family, and at an early age went to sea. In 1497, acting under a commission of the King of Portugal, he sailed on the great voyage of his life. On his return, he reported the boundless wealth of India, and the king rewarded him with rank of nobility and a pension. He made a second successful voyage, and in 1524 was made viceroy of India. He died in Cochin in the same year.

GAMA, *gah'ma*, **GRASS**, or **SESAME**, *ses'a me*, **GRASS**, a perennial wild grass found naturally in damp places from New England southward to the Gulf of Mexico and westward to Kansas. It also grows in South America. Its coarse, branching stems,



GAME BIRDS OF NORTH AMERICA

1—Mallard Duck. 2—Prairie Hen. 3—Canvasback Duck. 4—Wild Turkey. 5—Snipe. 6—Partridge.
7—Canada Goose.



GAME ANIMALS OF NORTH AMERICA

1—Caribou. 2—Moose. 3—Wapiti. 4—Pronghorn. 5—Bighorn Sheep. 6—Bison (no longer at large.)

which are filled with pith, spring from tough rootstocks and reach a height of about nine feet. The leaves, with their wide blades, are similar to those of corn; botanically, the two plants are closely related. Gama grass blooms in midsummer, bearing clusters of purple flowers. Because it is capable of enduring long periods of drought and has large yields of hay, the grass is a useful fodder plant, but cattle like only the young, tender hay.

GAMA'LIEL, a Jewish rabbi of the first century, A. D., noted as the teacher of Paul during the latter's boyhood. Gamaliel was a moderate and liberal-minded man; as a member of the Sanhedrin he advised his fellow-members not to persecute those who were spreading Christ's teachings (see *Acts* V, 34). Gamaliel was deeply respected as a doctor of the Law, and in after years it was said that regard for the study of the Law ended when he died. Great as was his prestige in the Sanhedrin, however, there is no historic foundation for the legend that he was president of that body.

GAMBETTA, LEON (1838-1882), a French statesman noted for his ardent devotion to republican principles. In 1869, having been elected by both Paris and Marseilles, he chose to represent the southern city in the Chamber of Deputies and showed himself an irreconcilable opponent of the empire and its measures, especially of the policy which led to the disastrous war with Prussia. When the Germans encircled Paris, he left that city in a balloon and set up his headquarters at Tours, from which, with all the powers of a dictator, he directed for a short time a fierce but vain resistance against the invaders. He was influential in shaping the Constitution of the Third Republic. After the close of the war he held office in several short-lived Ministries, and in November, 1881, he became Premier.

GAMBLING, a pastime involving the element of chance, with the hope of winning money. It is a form of amusement which has been greatly restricted by law. In consequence, public gambling is attended with the danger of arrest and punishment. Private gambling, difficult to locate, is widespread.

The commonest form of gambling is with playing cards, and the most popular gambling games are poker, rum, fan-tan and bridge whist. Playing cards, however, are not the only resort of gamblers. Horse-racing is one of the most pernicious forms of

gaming. Betting on horse races has become a vast business enterprise, though now greatly restricted through stringent laws. Another insidious form of gambling is on specially constructed tables, wheels, or boards. The most popular is possibly the roulette wheel, where a bettor's slight chance of winning money depends upon the turn of the wheel. The slot machine, where the bettor's chance of winning is as 2 to 5, with the odds against him, is another device to entrap the unwary.

GAME, from the viewpoint of the sportsman or professional hunter, includes those animals which are the objects of the chase and are hunted for their flesh, as distinguished from meat, fish and poultry. The game animals of the world are the wild animals. In Africa and some other parts of the world, lions, tigers, panthers, leopards, alligators and many other large animals are regarded as *big game*, though their flesh is almost never eaten. In the United States and Canada the only important big game animals are bears, moose, deer, antelopes, mountain sheep and goats. The buffalo was formerly one of the game animals, but is now almost extinct. Of the smaller animals, foxes, rabbits and hares are most common.

The game birds are more plentiful than the quadrupeds. An extensive list is not possible here; the most important are partridge, grouse, plover, quail, snipe, curlew, woodcock, rail, ducks, swans and geese. The term wild fowl is usually applied only to the last three. Among the common varieties of ducks are the mallard, redhead, canvasback, teal, pintail and wood duck. See color-plates, **GAME ANIMALS**, **GAME BIRDS**.

Game Laws. In modern times the growth of population and the threatened extinction of all wild game has led to the passage of laws for the regulation of hunting, both to protect game from destruction and to protect persons in the legitimate enjoyment of such sport. Such laws have been passed from time to time in America ever since the landing of the Pilgrims, in almost every case for the purpose of protecting the game. Hunting and fishing are regulated chiefly by compelling the taking out of licenses, by limiting the number which each hunter may kill or may ship, by making more stringent the laws of trespassing and by forbidding the killing during the mating season and period of reproduction.

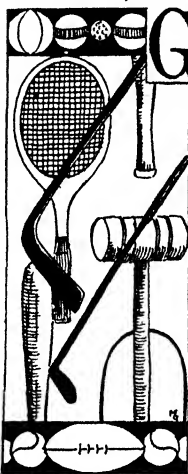
The chief subjects of such laws have been the deer, quail, grouse, prairie chicken, ducks and especially valuable or rare fish, such as trout and muskellunge. In almost every state of the United States and in every province of Canada, the killing of quail, grouse, prairie chickens, ducks, moose and deer is prohibited during certain seasons, varying according to the habits of the species of the several localities. By an act of Congress, approved March 4, 1913, all birds which do not remain within the borders of a single state are placed under the protection of the United States Department of Agriculture. The regulations permitted by the law were proclaimed by the President on October 1, 1913; they established a breeding zone and a wintering zone, with separate closed seasons for each.

Game Preserves and Reservations. In medieval Europe it was the rule for princes to maintain private breeding and hunting grounds. This custom was adopted by the nobles and is still in force in Austria-Hungary, Germany, England and Scotland, where immense properties known as hunting estates have been maintained by private land owners for the preservation of game. During the World War, however, many English preserves were abandoned because of the need of land for agriculture.

In the United States the preservation of game has been assumed as a function of the national, state and local governments, and the greatest efforts are being made to prevent the extinction of peculiar species, such as the bison, the caribou, the eagle and other interesting birds and beasts. To further this end, tracts of land have been set aside where such animals can live the life their instincts demand, free from the depredations of hunters or the annoying presence of settlers. The first and largest of such reservations in the United States is the Yellowstone National Park, having an area of over three thousand square miles. At the present time there are many such sequestered tracts, situated in states and territories west of the Mississippi River, embracing a total area of more than ten thousand square miles. Canada has also made generous provisions for the same purpose, the largest of all such reserves being the Wood Buffalo Park, Alberta, with an area of 17,300 square miles.

Besides these government reservations, there are large private parks ranging from

10,000 to 80,000 acres each. Probably the finest game preserve in America is that of the late George W. Vanderbilt at Biltmore, North Carolina. The game preserves of Canada are of enormous extent. The Forest Reserves as well as the Animal Parks are game reserves; altogether they cover an area of about 60,000 square miles.



GAMES AND PLAYS. The educational world today completely recognizes the importance of play in the development of a child's character, and most public school systems make provision for games and plays in their course of study. Large cities are not only establishing playgrounds at public expense, but are also providing attendants who can teach the children interesting and healthful games. The suggestions here given are for the purpose of assisting

teachers and parents who wish to teach the children under their charge to play in the right way.

Value in Play. "Play is not trivial; it is highly serious and with deep meaning," says Froebel. Play is one of the ways in which the child expresses himself. Games furnish one of the means of securing at least part of the development stated in the educational ideal—"a healthy mind in a healthy body." Games aid in the cultivation of social and of competitive activity; they afford an opportunity for ethical training.

The play time furnishes an opportunity of so refreshing the body and mind, stiffened or fatigued from close application to work, that the work itself will be more advantageously pursued, and the time used in exercise more than made up because of renewed interest and attention. Because little children become easily fatigued, frequent brief play periods should be provided for, rather than one long one.

Aims. This work in physical training should always be:

(1) Hygienic, adding to the health of the child through its good effects on circulation, respiration, etc.

(2) Corrective, tending to correct the de

fects in posture and movement caused by stooping over desks, etc.

(3) **Educative**, training the brain, nerves, and muscles to alert, controlled action: the harmonious working of body and mind.

(4) **Recreative**, furnishing relaxation, fun, joy, all of which increase the value of the work for the pupil.

Now every game cannot have all these four values. The game, the aim of which is educative, as ring toss, which requires precision of movement and quick response of the body to the mind, should be played often, but not to the exclusion of others whose main aim is, let us say, hygienic, as racing, which gives a healthy stimulus to the circulation and respiration. Vary your games.

Some Simple, Practical Suggestions. Do not waste the short play time in making elaborate plans about what is to be played; get right to business and keep things moving.

During the game, throw open the windows so that the air may be completely changed.

Let the teacher enter into the spirit of the play, making it a period, to an extent, of recreation to herself. She needs it.

Encourage the children to get into the habit of taking deep, full breaths to "wash out" the lungs. Tell them to take three such breaths every time they step out of a door into the air.

The best method of teaching a game is to make a full explanation of it before the pupils take their places to play. Never try to teach and play a game at the same time.

As a rule let the children choose the games. Encourage "team" work, trying with all their might to win for their side.

Insist on holding to the simple rules of the game—to the honest winning or losing of a game.

Games for Young Children

In the Schoolroom or the Home

I Saw. A child in each row tells of some action he has seen, as a duck flying, a soldier marching, or a train speeding, at the same time illustrating it. Each row in turn follows its leader around the room, imitating the action shown.

Express Train: Children are chosen for engine, headlight, bell, wheels, conductor, passengers, etc., and run in a row up and down the aisles, executing the action appropriate to each part. "Train is stopping!" calls the teacher. It comes to a standstill, children take their seats, and another train is "made up."

Squirrel Game. The children blind their eyes with heads upon their desks, and one

hand open, in the hope of getting a nut which one child, the "squirrel," may drop into it. The child who receives the nut runs on tip-toe after the squirrel and tries to catch him before he reaches his seat. If he does not, then he is "squirrel."

Hole in the Ice. The "hole" or "crack" in the ice is represented by two chalk lines on the floor. One row of children at a time runs or jumps, in turn, trying to jump over the "hole." If any one touches the floor between the lines, instead of going home to his seat he must first come to the front of the room, while the other rows are jumping, and dry his feet by running on tip toe "on place." The width of the "crack" may be gradually increased. This game is good for circulation and respiration.

Follow the Leader. A competent child leads the class around the room, up and down the aisles, skipping, then waving, stepping high like a horse, clapping, etc., changing quickly from one to another. The other children imitate. This and the following are excellent for brief recreative exercise.

Review Roundel. (This may be sung to the tune "Yankee Doodle.")

"There you stand before us all

To teach us what to do, sir!

Now show a motion you recall

And we will follow you, sir!"

The pupils should stand at their desks or in a circle. The pupil chosen for "teacher" stands in front. The pupils march forward on lines 1 and 3, and backward to place on lines 2 and 4, singing as they step. At the close of the song, the "teacher" shows a favorite exercise, as sawing wood, touching the floor with the finger tips with knees sprung back, etc. The rest of the class imitate it. "Teacher" may mark the rhythm by singing "la" to "Yankee Doodle" tune, as the pupils take the exercise. This game gives all a little exercise at once.

Bean Bag Games. The following games can be played with bean bags about 5 inches by 5 inches made by the children (a set of these should be in every schoolroom for games), or with a large, light rubber ball. Some games can be played out of doors.

The teacher may open the game as follows: As many pupils as possible may take places on a chalk circle drawn on the floor in the front of the room, or where there is a vacant space.

The pupil who is "it" or "teacher" tosses the bag to any pupil in the circle, who becomes "teacher" if he catches the bag, or must take his seat if he does not. The pupils for whom there was not room at first, may fill vacant spaces. The game may be varied by the "teacher" tossing the bag in the air and calling the name of the child, who becomes teacher if he jumps forward and catches it, or takes his seat if he does not. The latter variation of the game should be played very quickly.

Cat-Stitch. Number the rows or aisles of children, 1, 2, 3, 4, etc. The pupils should stand, each even row facing the nearest odd

row. The first pupil in the even row tosses the bag to the second pupil in the odd file, the bag continuing in a zigzag course to the last pupil, who tosses it directly across, so that after returning in a zigzag course, the first pupil in the odd row will have the bag. Count may be kept to see which double row finishes, without dropping the bag, first. Allow laughter, but insist on attention.

Touch Ball. The ball or bag is passed rapidly from one to another of those forming the circle high or low, across the circle, or in any direction, stated by the teacher. A player, or "it," in the center, tries to touch the ball or bag, and changes places, when successful, with the one who had it when it was touched.

Out of Doors

Play out of doors when possible. Some of the following games may be played indoors, if space permits, in stormy weather:

Cat and Mouse. The players form a circle, grasping each other's hands and standing about an arm's length apart. The cat stands outside the circle; the mouse to be caught stands inside. The pupils forming the circle may favor one or the other by raising arms to allow passing in and out of the circle, or may lower arms to prevent it. As soon as the mouse is caught, other players are chosen.

Hawk and Hen. About ten or twelve children stand, one behind another, with their hands on the shoulders of the player in front, and represent hens. Another player the hawk, tries to catch the last hen in the line, and the first hen tries to prevent this by getting in front of him, and by raising arms, etc., while the rest try to keep out of the way of the hawk. As soon as a hen is caught, she is out of the game. Choose an alert mother hen to head the line.

Moon and Morning Stars. This game is played when the sun is shining. One of the players is the moon and takes her place in the shadow of the schoolhouse, a tree, etc. She must not go into the sunshine. The other players, the morning stars, dance from the sunshine into the shadow near the moon, calling:

"O the Moon and the Morning Stars!
O the Moon and the Morning Stars!
Who will step—Oh,
Within the shadow?"

The moon tries to tag the stars, and they may either be kept with her or change places with her, as the players decide.

Dare Base. A line is drawn midway between the goals. A catcher stands at each end of this line. The other players run back and forth between the goals; they may not be tagged when in the goals or on the base line, but they may not pass back to the goal from which they started until they have gained the opposite goal. Those who are caught are put out of the game, or they may be made catchers.

Black Man. One is counted out as Black Man. The rest come round, crying, "Who is afraid of the Black Man?" Suddenly the

Black Man begins to chase. When one is caught, he is Black Man, or else he may be the Black Man's Helper. The game closes when all are caught. Bounds must be set beyond which no one may run.

Frog in the Middle. Any number may play this. One player is chosen for "frog" and sits in the center with his feet crossed. The other players stand in a circle around the frog, repeating, "Frog in the middle can't catch me!" They dance forward toward the frog and back, taking risks in going close. He must keep his position while trying to tag his tantalizers. The one tagged is frog.

Other Games. Among other games suggested for young children are the following: Mulberry Bush, Farmer in the Dell, Jacob and Rachel, Oats, Peas, Beans, Drop the Handkerchief, London Bridge, Hopping, Three-Legged and Backward Races, Stoop Tag, Wood Tag, Pussy Wants a Corner, Bean Bag Throw, Itsket-Itasket, Shadow Tag, Follow Chase. Most of these one child or another will recognize by name and will gladly lead. See, also, Kindergarten.

Games for Older Children

In the Schoolroom or the Home

Many of the games suggested for young children remain favorites and may be continued as the children grow older. As children grow older they enjoy the "team" element in games and are more anxious for their side to win than are the young children, who love more the mere activity of the game. Races, especially relay races of all sorts, appeal, therefore, to older children.

Bean Bag Race. Bean bags, books, erasers, or wands are held above the heads by pupils seated in the front seats. All the children sit erect with arms raised overhead. At command the bags are passed backwards above heads by pupils until the last pupils are reached. These pass them forward in the same manner. The pupil in front first receiving the bag rises to show which row has won. Allow the enthusiasm free expression in this most valuable game.

First In, First Out. A group of three erasers, or bean bags, etc., is placed in a chalk-marked square on the floor in front of alternate rows. The players, beginning with the pupils in the front seats of these alternate rows, take the objects one at a time from the square and place them in a similar square at the back, running down one aisle and returning by the other. When all are gathered, they are returned in the same manner, and the pupils in the second seats, without pause, continue the game. The row whose pupils finish first indicate it by clapping. The game is full of fun and excitement and a great outlet for the repressed energy of the child from ten to fourteen.

The same rules apply to the game of running to touch front and back wall in succession, and then taking the seat which can

be played when time is very limited and relaxation for all is desired.

Running Relay. The room may choose sides to last for a week. These sides may stand in close rows in the two center aisles, leaving aisles for runners at each side. Each leader has one bean bag. At the teacher's word "Go," the bag is passed rapidly down the line. The last pupil runs to the head of the aisle with it and the passing continues, the line gradually moving down as the children come to the head. This lasts until the first player is in his position again as leader. The side whose leader is first in place indicates winning by clapping.

Tossing Tally. Let pupils, one from each row in turn, stand at a given distance from a slanted board, two by three feet, with an opening eight inches square in the center, and throw bean bags. Bags passing through the center score ten points; those landing on the top of the board score five points, and those landing on the floor diminish the score by five points. Bags displaced count for the rows by which they are displaced. The score should be 100.

Out of Doors

Three Deep. The players form a double circle, one within the other. The distance between the players must be two steps. One player stands directly behind another. There are two "its," one trying to tag the other as he runs around the outer circle. Just as he is about to be tagged, the runner quickly moves to the inside in front of a pair of players (making "three deep"), and then the last, or outside player, must run. If the tagger succeeds in touching the runner before he jumps inside, they reverse the running, the one who has tagged trying to get in front of a pair at once. The children should never run across the circle or between circles to reach inside. The game is a particular favorite with older children.

Fire on the Mountains. Places are marked in a circle by sticks or stones, with considerable space between, providing for two less spaces than there are players. One of the odd players is a leader, and sits or stands in the center; the remainder, or "circle men," take the places marked. The other odd man stands anywhere between the bases or marked places. The object of the game is for the "circle men" to change places on a signal from the leader, each player trying to avoid being the odd man by losing a place. The longer the distance between the bases, the better the sport. The running must be done in a circle outside of the bases and no cross cuts through the circle are allowed. The player in the center calls:

"Fire on the mountain, run, boys, run!
You with the red coat, you with the gun;
Fire on the mountain, run, boys, run!

Base!"

Then the changes must be made, the center man and the other odd man trying to get a base. Those left out are the "its" as the

game continues. Forfeits may be used in this game.

Last Couple Out. This game requires an odd number of players. One is chosen for catcher, who stands with his back to the rest, not less than ten feet in front of the rest of the players. The rest of the players stand in couples in a long line behind him, facing in the same direction that he does. The catcher calls, "Last couple out!" Then the last couple in the line runs toward the front, the right-hand one on the right side of the double line, and the left-hand one on the left side, and try to join hands in front of the catcher. The catcher must not chase them before they are in line with him, and must not turn his head to see them as they come. They should try to confuse him by circling far out beyond him on either side, or by one keeping close and the other circling out, etc. If the catcher succeeds in catching one of the players before that player can clasp hands with his partner, these two, catcher and caught, form a couple at the head of the line, which moves back a step. If neither is caught they are free, or out of the game.

Trade Game. A few players step aside and decide on some trade to represent. They advance to the others, saying: "Here we come!" The others respond, "Where from?" "New York," they reply. "What's your trade?" The few then show in pantomime some trade, either all taking the same action, or various actions used in the occupation chosen. The first one to guess the trade chases the players, trying to tag those desired for the next trade game, which the guesser promptly gathers a few players to decide upon. This is one of the most valuable of the "guess-action" games, which the teacher can vary to suit the needs of the school.

Other Games. Among other games suggested for older children are the following: Potato Relay Race, Black Tom, Hound and Rabbit, Prisoner's Base, Indian Club Race, Vaulting Relay Fox and Geese, Tug of War, Poison Snake, and Medicine Ball. Most of these the children will recognize by name. Discussion of the rules in school helps greatly when the games are played.

Quiet Games

The following quiet games, with fewer physical values, are yet of great value for recreation and for mental training:

Magic Music. An object is hidden after one child has been sent from the room. Upon his return, those in the room help him to find it by humming a familiar tune or by clapping, softly at first, but loudly as he nears the hidden object. This is good for ear training and motor control.

Beast, Bird or Fish. One child comes to the front of the class and says: "Beast, bird or fish!—Bird! Martha!" Before the child in front counts to ten, Martha, or whoever is

chosen, must call out the name of a bird or else come to the front. Beast and fish are called in the same way.

GANDHI, MOHANDAS KARAMCHAND 1869-), was born in Porbander, Western India, of petty-trader stock ranking fairly high in the Indian caste system. At the age of fourteen he was married, and at nineteen went to London, where he studied law and was called to the Inner Temple. In 1893 he was sent from India on behalf of a merchant who wanted his African interests set in order. There he developed from a briefless barrister to arch-agitator against the suppression of the rights of Indian settlers, and was imprisoned.

Returning to India in 1914, he did good work as a recruiter for the Indian Army during the early days of the war, and led the Indian Home Rule movement.

In 1919 he denounced the Indian government's sedition bills and began a no-tax campaign which, despite his desire to maintain it on a non-violent basis, resulted in serious bloodshed. In 1922 he was arrested for conspiracy and imprisoned, but was released in 1924 on account of ill-health. He began a civil disobedience movement in April, 1930, and was arrested and interned in May, but was released under amnesty in January, 1931; he suspended the movement while he attended the Round Table Conference at London as the sole representative of the Indian Congress party.

There it became manifest that between Congress and other Indian parties were wide differences of opinion, and in India his followers were restive, wanting to restore civil disobedience. Gandhi returned in 1932 and immediately resorted to civil disobedience, when he was again arrested and interned. While in prison the Communal Award, apportioning legislative rights between India's varying communities, was made, and Gandhi began a fast against the leaders of Hinduism for maintaining a preponderance of caste representation at the expense of "untouchable" (low-caste) Hindus. In 1933 Gandhi was released, having resolved to spend his life obtaining better conditions for the low-caste Hindus and to conduct a village reform campaign. His followers give him the undesired prefix "Mahatma" (Great-souled). His autobiography is *An Experiment in Truth*.

GANGES, *gan'jeez*, an important commercial river of India, one of the largest in Asia.

To devout Hindus it is the sacred Ganges, for they believe that its waters possess healing properties, and that one who dies on its banks and drinks of its waters before death is assured of entrance into Paradise. Hindus venerate Benares above all places in the world, and the devotee who can die on the river banks of the city is considered twice-blessed. The stream there is 1,450 feet across in the dry season (September-April), but doubles its width when the freshets arrive.

The river rises in the Himalaya Mountains nearly two miles above sea level, and falls by several channels into the Bay of Bengal. Its total length is 1,557 miles. The Ganges delta, which is probably the largest in the world, commences about 200 miles from the sea. The valley is one of the most fertile in the world, and produces almost all kinds of Indian vegetation, including rice, fruit, cotton, indigo, opium, sugar and grains. As a highway for commerce the Ganges is a very important stream.

GANGLION, the enlargement of a nerve, containing cells and fluids and acting as a center for communication with other sets of nerves or for strengthening nervous impulse. See NERVOUS SYSTEM.

GANGRENE, the death of some part of a living body, wherein the tissues are in a state of mortification. If a vital part is so affected, death will ensue, but a local affection may be stopped by amputation or, in milder cases, by careful hygienic and medical treatment. Because of marked advance in surgery and aseptic methods, gangrene is less common than formerly. See SURGERY.

GANNET, a large sea bird, about three feet in length, with a wing expansion of six feet. It has a dirty white plumage and pale yellow eyes, surrounded by a naked blue skin. Its straight bill is about six inches long and is furnished, underneath, with a kind of pouch. The gannet is found from the Arctic Sea to the Gulf of Mexico and breeds in large colonies near the coast of Labrador. The birds hunt from high in the air, and when they see a fish they drop straight upon it with wonderful accuracy. When on land the bird is absurdly fearless, and the mother when approached will remain on her nest, merely pecking if a hand is put out toward her.

GANYMEDE, *gan'i meed*, in Greek mythology, a Trojan youth so beautiful that even the gods marveled at him. Jupiter sent

his eagle to steal the boy from Mount Ida and carry him to Olympus, where he succeeded Hebe as cupbearer to the gods.

GAPES, *gaypse*, a disease of fowls, arising from the presence in the windpipe of small, parasitic worms, which cause the bird continually to open its beak and to cough. The parasites may be dislodged with a feather dipped in turpentine or by mixing a little epsom salts with the food. Another remedy consists in making the fowls breathe the dust of air-slaked lime. This causes a spell of violent coughing and dislodgment of the worms. After the fowls have recovered, the coops and all their contents should be disinfecting.

GAR, the name of two species of fish, which are similar in structure and appearance. The marine gar is round and slender, from three to five feet long, and has a stout bill, formed by a prolongation of the jaws. These fish are widely distributed in the warm ocean waters and live upon smaller fish. The fresh-water gar has a long, nearly cylindrical body, covered with bony scales; the head has a long bill with a series of sharp teeth. This fish is common in lakes and rivers in the eastern part of the United States.

GARAGE, *gahr'azh'*. The advent of the automobile gave rise to many accessories. One of the most conspicuous is the *garage*, which is a place for storing and caring for automobiles. Connected with public garages are mechanical departments, in charge of men competent to make repairs. The word was borrowed from the French, without change in form, and means to *keep under cover*.

GARBAGE, *gahr'bazj*, the waste matter, mostly of animal or vegetable origin, that comes principally from kitchens. This waste quickly decays if exposed to the air and becomes a source of disease. If it is thrown upon the ground, the water supply and the air in that vicinity are contaminated. In the country and in small towns a great deal of garbage is consumed by domestic animals and so rendered harmless, though if the troughs in which it is held are not frequently cleaned, the animals themselves may suffer.

In small communities methodical garbage disposal is considered possible only in one way—by burning—but in large cities a revolution has been wrought. What was once an expense to a city has now become a

source of much revenue. Formerly \$50,000 per year was paid by the city of New York to a contractor for the removal of all the city's garbage, which the householder places in cans provided. He offered to do the work for that really nominal sum because he admitted that certain parts of the collections could be turned to profit. A few years later it was discovered that his profits were very large; scarcely a bit of the garbage remained to be burned after it had been subjected to processes which extracted economically valuable products. The same contractor then offered to pay the city \$150,000 per year for the privilege of removing the city's garbage.

Value of Garbage. In the family garbage can are found the scraps of all foods which enter the kitchen and are not eaten, also tin cans, paper, rubber and the like. Modern conservation methods find a use for everything. The paper can be sent back to the paper mill, to become again new paper; tin cans are salvaged for the tin they contain, rubber can be used again in rubber manufacture. After all organic matter has been removed the vegetable matter remaining is boiled for several hours, then squeezed under very heavy pressure to eject all possible moisture. It is then made thoroughly dry, after which it is ground fine. This resulting powdery material is called *tankage*.

Tankage contains ammonia, potash and bone phosphate, and it is made into fertilizer of low grade. The liquid removed from the garbage by pressure after boiling is largely grease; from it is made soap and glycerine, and it enters also into the manufacture of dynamite and nitroglycerine. After all these products have been obtained there remains a residue which would appear to have no value, but it is sold for fuel in manufacturing plants.

GARCIA Y INIGUEZ, *gahr se'a e ne' ges*, CALIXTO (1836-1898), a Cuban patriot and soldier, born at Holguin, Santiago Province. He began the practice of law, but in 1868 became a leader in the Cuban insurrection and later succeeded Maximo Gomez as commander in chief of the Cuban forces. At one time, being surrounded by a greatly superior force, he attempted to commit suicide rather than be captured, but was taken to Spain and imprisoned. Afterward he joined in another Cuban rebellion, was again captured and was taken to Spain, where he was held for fifteen years. He escaped in 1895

and came to the United States, where he engaged in filibustering. Later he succeeded in reaching Cuba and won important victories as one of the chiefs of the Cuban forces. After the occupation of Cuba by the Americans, he was appointed one of the commissioners to discuss Cuban affairs with the United States government at Washington, and died during that conference.

When war first broke out between Spain and America, Garcia was in the wilds of Cuba. President McKinley sent a young man named Rowan to the island, with orders to find the insurgent leader and deliver a message to him. This most difficult task was accomplished so quickly and effectively that it inspired Elbert Hubbard to write his stirring *A Message to Garcia*.

GARDA, *gahr'dah*, the largest lake in Italy, nestled amid the beauties of Alpine scenery. The mountains tower on three sides of it, and on their slopes are perfect highways. During the World War Italian and Teutonic armies fought on two sides of Garda. The lake is over thirty miles long, and it varies from three to eleven miles in width.

GARDEN, MARY (1877-), a grand-opera star, born in Edinburgh, Scotland. When very young she moved with her family to America, where her musical education began with study of the violin, at the age of six. In course of time she studied piano, and at the age of nineteen, with the help of friends, went to Paris, where she spent four years cultivating her voice. Her début came quite unexpectedly in 1900, when, on a certain evening the leading soprano of the Opéra Comique in Paris became suddenly ill at the end of the second act of Charpentier's *Louise*; Miss Garden sang the third act and continued the part for a hundred nights. Subsequently she sang in London, Brussels and other European centers. She made her American début in 1907. Garden appears to best advantage in parts for which she is temperamentally equipped, notably *Mélisande*, *Thais*, *Sappho*, *Louise* and *Salome*. She possesses a rare gift of impersonation which quite offsets for purposes of music drama certain vocal inadequacies. Miss Garden was manager of the Chicago Opera Company for the season, 1920-1921.

GARDENIA, *gahr dé'ni a*, a shrub of the madder family, bearing white or yellow flowers of attractive appearance and de-

lightful fragrance. A double-flowered variety grows out of doors in the southern part of the United States, and it is a popular hothouse plant in the North. The name was bestowed on the gardenia group by Linnaeus, who selected it to honor Dr. Alexander Garden, of Charleston, South Carolina. An East India species yields a beautiful yellow resin, and the hard wood of another species is used for agricultural implements in South Africa.

GARDENING, the art of cultivating plots of ground, for the purpose of raising ornamental flowers, vegetables and fruits. This art is as old as civilization itself. According to Bible lore, Adam and Eve had their first home in a garden, and the delight of the ancient Egyptians and Babylonians in their gardens is disclosed by their records. Gardening never lost favor through the ages that followed, and to-day it is being emphasized more than ever, both for practical reasons and from an esthetic and recreational standpoint. Flower gardens train the artistic sense and educate one in matters of line and color, besides teaching the gardener many facts of botany. These gardens, no less than those devoted to vegetables, may be a valuable source of profit. There is no question, too, as to the healthfulness of gardening. It takes one out of doors and provides a wholesome form of exercise. There are many periodicals and books devoted to all phases of home gardening, and these should be of great value to the beginner.

In America school gardens have been encouraged by the Agricultural Department for a number of years, but notwithstanding the popularity of these, the home garden came into unprecedented favor after the country entered the World War. The government asked all who had available space to devote it to the raising of food products, and so widespread was the response that the war gardens of 1917 and 1918 yielded crops worth millions of dollars.

School Gardens. While the school garden in the United States is of comparatively recent date, it has been in existence in Europe for a long time, and European countries now have over one hundred thousand school gardens. In Russia and several other countries, no school can receive aid from state funds unless it has a garden. A school garden is valuable for the following reasons:

(1) It enables the pupils to gain a practical knowledge of farm crops.

(2) It assists in giving the pupils practical training.

(3) It affords the best opportunity for nature study.

(4) It affords opportunity to train pupils to habits of industry and to develop the feeling of ownership and responsibility.

(5) It affords one of the best means of assisting pupils to gain an all-round development.

(6) It helps to keep the boys and girls on the farm.

In making a school garden the following suggestions will be found helpful:

(1) Secure the consent and coöperation of the school directors.

(2) Have your plans well matured before beginning work on the ground.

(3) So plan the work that it will be done out of school hours.

(4) Study and work with enthusiasm, make the garden succeed and it will be popular.

GARDEN OF THE GODS, a beautiful region about five miles northwest of Colorado Springs, noted for the curious and grotesque shapes into which the colored sandstone rocks have been worn by the wind and rain of countless ages. The Garden has an area of 500 acres. Two huge masses of bright red sandstone, 330 feet high and separated just enough to allow a roadway between them, form the gateway of the Garden. Other famous rocks, whose names indicate their shape, are the Cathedral Spires, the Balanced Rock and the Seal and the Bear.

GARDINER, SAMUEL RAWSON (1829-1902), an English historian, born at Ropley, Hants, England, and educated at Winchester and Christ Church, Oxford. He also studied at Edinburgh and Göttingen and was for many years professor of modern history at King's College, London, and later at Oxford. He was appointed to succeed Froude as regius professor of modern history at Oxford, but declined. Gardiner was the author of numerous historical works of the highest value, of which the most important are *The History of England from the Accession of James I to the Outbreak of the Great Civil War*, *The History of the Great Civil War*, and *The History of the Commonwealth and Protectorate*. The last was not quite completed at his death. Another important work was *The First Two Stuarts and the Puritan Revolution*, which was a condensed but exceedingly valuable story of the same

period. He also wrote a *Students' History of England* and *An Introduction to the Study of English History*.

GARFIELD, HARRY AUGUSTUS (1863-), a distinguished son of President James A. Garfield, was born at Hiram, Ohio. After his graduation at Williams College in 1885 he taught school for a year and then engaged in law practice at Cleveland. From 1903 to 1908 he was professor of politics at Princeton University, and in the latter year was chosen president of Williams College. This position he held until 1917, when he resigned to accept the position of fuel administrator for the United States. In this post it became his duty to conserve the supply of fuel so that needed war industries would not suffer. After the war he returned to the presidency at Williams College, which post he resigned in 1934. He was the founder of the Williamstown Institute of Politics, which became a powerful director of opinion.



Tomb at
Cleveland

GARFIELD, JAMES ABRAM (1831-1881), an American soldier and statesman, twentieth President of the United States. His election to the highest office of the nation was the climax of a career in which he had won an honorable reputation as a teacher, military leader and Congressman, and he assumed his new duties with high hopes. Barely four months from the day of his inauguration he was shot by a disappointed office seeker, and died eleven weeks later, the second President to suffer a martyr's fate. It is of interest to recall that sixteen years before, at the time of Lincoln's assassination, he had calmed an angry mob in Wall Street by a few eloquent words, concluding with—"Fellow citizens! God reigns, and the government at Washington still lives."

Garfield was born in Orange, Ohio, on November 19, 1831. His father died soon after the boy's birth, leaving his wife, unaided, to bring up her four small children. At the age of ten, young Garfield added to his mother's income by work on neighboring farms and by driving horses on the Ohio Canal. In winter he made steady progress

Outline on Garfield

- I. JAMES ABRAM GARFIELD
 - (1) Birth and parentage
 - (2) Work during boyhood
 - (3) Attended district school
 - (4) Seminary and college
 - (5) Teacher. Study of law
- II. MILITARY CAREER
 - (1) Battle of Middle Creek
 - (2) Battle of Chickamauga
 - (3) Promotion to be major-general
- III. CAREER IN CONGRESS
 - (1) Work on committees
 - (2) House leader of Republicans
 - (3) Election to Senate
 - (4) Made Presidential nominee
- IV. ADMINISTRATION
 - (1) Factions in Republican party
 - (2) Controversy with Conkling and Platt
 - (3) Death and burial

Questions on Garfield

Why did Garfield have to work during his boyhood?

How old was he when he served on the "towpath"?

To what Church did Garfield belong?

How did he obtain a college education?

Of what institution was he a graduate?

What position did he afterwards hold in his *alma mater*?

How did Garfield distinguish himself as a warrior?

Upon what questions was he authority while in Congress?

What new departure did he make as a Presidential nominee?

Who was his opponent in the election?

What was the result of his dispute with Senator Conkling?

Quote Garfield's memorable words referring to Lincoln's assassination.

What was his record throughout the Civil War?

For how many years was he a college president?

How many Presidents of the United States have been murdered while incumbents of that high office?

in the district school, and in 1849 he entered Geauga Seminary, at Chester, Ohio. He next went to the college at Hiram, Ohio, supporting himself meanwhile by tutoring, and finally was graduated at Williams College, Mass., in 1856. Returning to the college at Hiram, he became its president in 1857, at the same time studying law. He also preached occasionally, as he was a member of the Disciples of Christ Church, which gave lay members that privilege in the days when Garfield was a young man.

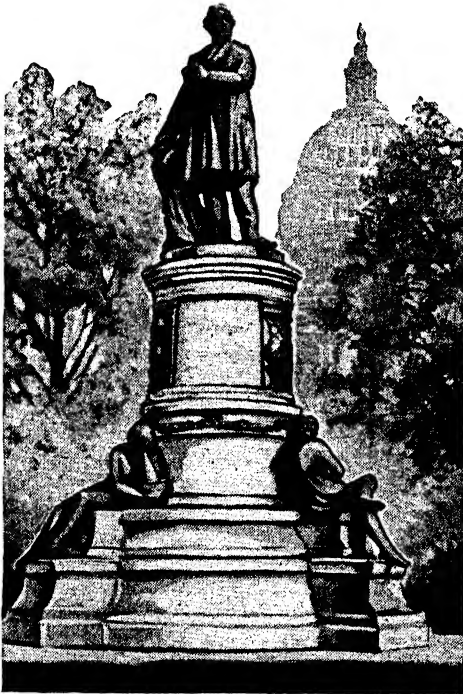


Garfield was elected to the state senate in 1859, and on the outbreak of the Civil War he received the command of a regiment of Ohio volunteers. In December, 1861, he was given a brigade, with orders to drive the Confederates out of Eastern Kentucky, and he won the battle of Middle Creek, January 10, 1862, from which his commission as brigadier-general was dated. He was promoted to be major-general for gallantry at Chickamauga, September 19, 1863, but resigned his command to enter Congress, at the age of thirty-two. He sat in Congress, rendering valuable assistance in military and financial questions, until 1880, and he was a leader of the Republican party in the House.

In January, 1880, Garfield was elected United States Senator, and in June of the same year he was named Presidential candidate by the Republican convention at Chicago. Garfield's nomination came as a surprise to his party and was simply the result of a compromise between the supporters of Grant and Blaine. He proved, nevertheless, a strong candidate, and regardless of precedent delivered speeches in his own behalf, defeating General Hancock by a narrow majority of the popular vote, but by 215 to 155 electoral votes.

Garfield was unable to carry out his plans of harmonizing the two factions of the Republican party. The so-called "Stalwart" faction, headed by Senators Conkling and

Platt of New York, opposed his appointment of W. H. Robertson as collector of the port of New York, and a bitter controversy en-



MONUMENT AT WASHINGTON

sued, which resulted in the resignation of the two Senators. Their legislature refused to reelect them, and the Senate confirmed Garfield's appointment of Robertson.

The President was therefore the victor in this first battle of the factions, and it was with a light heart that he set off, on the morning of July 2, 1881, for his old college, to attend a class reunion. While he was walking through the railway station at Washington he was shot down by a disappointed office seeker, Charles Guiteau. For weeks he lingered between life and death, but in September he died near Long Branch, N. J., where he had been taken in the belief that the change of air might do him good. He was buried in Cleveland, Ohio, where a beautiful mausoleum has been erected. A subscription was immediately started for the family, and in a short time over \$350,000 had been subscribed. When Guiteau was brought

to trial his advocates attempted to show that he was insane, but convincing proof was lacking, and he was hanged in June, 1882. On Garfield's death, Vice-President Chester A. Arthur became President.

GARGLE, *gahr'g'l*, a wash for the throat.

In using a gargle the head should be thrown well back, to keep the liquid in contact with the throat; then by expulsion of the air from the lungs through the liquid it is churned about and the throat is thoroughly washed. Care should be taken not to swallow the gargle, which sometimes contains drugs too powerful for the stomach. Listerine, glycerine and water, in equal parts, is an effective gargle for sore throat.

GARGOYLE, *gahr'goil*, a stone water spout usually of grotesque design jutting from the roof gutter of a building. While elaborate spouts representing animal heads were in use in ancient times, the typical gargoyle, a figure of fantastic ugliness, was evolved along with Gothic architecture and used extensively on medieval and Renaissance cathedrals. It is by some believed to have originated with the superstition that hideous figures in conspicuous places on the building would frighten evil spirits away from the sacred precincts. Particularly famous are the gargoyles on the Cathedral of Notre Dame, Paris. See NOTRE DAME.

GARIBALDI, *gahr bah'de*, GIUSEPPE (1807-1882), an Italian patriot and hero, honored for his great services to the cause of Italian liberation. He was born at Nice, the son of a merchant captain. Giuseppe left school at the age of fifteen and went to sea as a cabin boy, qualifying as a merchant captain within ten years. Then the course of his life was suddenly changed by his conversion to the Young Italy movement, of which Giuseppe Mazzini (which see) was the ardent leader. Garibaldi was condemned to death for his share in the uprising of 1834, but he escaped to Marseilles, France, and in 1836 decided to try his fortune in South America. Before long his sympathies were drawn to the tiny Republic of Rio Grande do Sul, which had revolted against Brazil. Garibaldi eagerly plunged into the struggle, becoming a freebooter on sea and a guerrilla chieftain on land. Later, he effectively aided the Montevidians against Buenos Aires, assuring the freedom of Uruguay.

Meanwhile, rebellion was stirring at home, and in 1848 he returned to Italy, raised a band

of volunteers and harassed the Austrians until the reestablishment of Austrian supremacy in Lombardy. He sailed to the United States and was for some years in command of a merchant vessel. He then purchased a part of the small island of Caprera, off the north coast of Sardinia, and made this his home for the rest of his life. Latterly the subscriptions of his admirers enabled him to become owner of the whole island.

In the war of 1859, in which Sardinia recovered Lombardy, Garibaldi and his Chasseurs of the Alps did splendid service; and on the revolt of the Sicilians in 1860 he crossed to the island and wrested it from the king of Naples, after a fierce struggle. He then recrossed to the mainland and occupied Naples, where he was proclaimed dictator of the Two Sicilies. It was then feared that Garibaldi might prove untrue to his motto, "Italy and Victor Emmanuel" but he readily acquiesced in the annexation of the Two Sicilies to Italy and, declining all honors, retired to his island farm. In 1870 he gave his services to the French government against the Germans and rendered valuable assistance in the southeast. At the end of the war he was elected a member of the French assembly, but resigned his seat and returned to Caprera. In January, 1875, Garibaldi took his seat in the Italian Parliament, but did not distinguish himself politically.

GARLAND, HAMLIN (1860-), an American novelist and poet. Among his novels, with their realistic pictures of western life, are *The Rose of Dutcher's Cooly*, *The Eagle's Heart* and *Captain of the Gray Horse Troop*, while of his other works may be mentioned a sympathetic biography of Ulysses Grant; a volume of criticism called *Crumbling Idols*, and *Prairie Songs*, a volume of verse, were among his earlier works. As a short-story writer Garland takes rank among the best, and *Main Traveled Roads* (1898) is a volume in his happiest narrative style. Later books from his pen include *The Long Trail*; *The Tyranny of the Dark*; *The Shadow World*; *Other Main-Traveled Roads*, *A Son of the Middle Border*, and *Roadside Meetings*.

GARLIC, a hardy plant related to the onion, whose edible part has a strong, penetrating odor and a sharp taste. The Italians and Spanish are fond of garlic, and they season many foods with it, but to most North Americans it is very disagreeable. The plant grows about two feet high and bears

grasslike leaves, resembling those of the onion, except that they are not tubelike. Garlic root, the part eaten, is a compound bulb, consisting of several smaller bulbs, or *cloves*. The plant is usually propagated by the cloves, and is easily cultivated.

GARNET, the birthstone for January, is a beautiful mineral classed as one of the semi-precious stones. It occurs in twelve-sided crystals, usually of a dark red or cinnamon color, but sometimes it is white, green, brown or black. Ordinary garnets are of little value; these are ground and used in polishing other stones or are employed instead of sand in making sand paper. The garnets of gem quality are found principally in Bohemia, Ceylon and South Africa. See **PRECIOUS STONES**; **BIRTHSTONES**.

GARNER, JOHN NANCE (1869-), an American statesman, born in Red River County, Texas. He had limited school advantages, and in his youth worked on cattle ranges, studied law, and edited a paper. In 1890 he was admitted to the bar, later became county judge, and from 1898 to 1902 was a member of the Texas legislature. In 1903 he became a member of the 58th Congress and served in that body continuously for thirty years, being speaker of the House during the 72nd Congress. Vehemently partisan in debate, he often voted against his party on important issues. He advocated large Federal appropriations for public works. In 1932 he was elected Vice President of the United States on the Democratic ticket, and renominated in 1936.

GARNISHMENT, the legal process by which property or assets of a defendant in the hands of a third person are seized and used in satisfying a plaintiff's claim. It is most commonly used to secure the payment of a debt by seizing the wages of a debtor, although in some states persons in certain classes of labor are not subject to suit where their wages are involved.

GARONNE *ga rohn'*, **RIVER**, an important river of France, forming, with its thirty-two tributaries, a system of navigable waterways of greater extent than that of any other river in the country. It rises on the Spanish side of the Pyrenees, entering France twenty-six miles from its source. Ocean steamers ascend the Garonne to Bordeaux, the largest city on its banks, and at Toulouse it meets the Canal du Midi, which extends to the Mediterranean Sea. The Garonne is 400

miles long, and its drainage basin is 38,000 square miles in area.

GARRICK, DAVID (1717-1779), the most famous of English actors. He was born at Hereford and educated at a grammar school in London. After an unsuccessful attempt to learn the wine trade in Lisbon became a pupil of Samuel Johnson, with whom he remained for seven years. In 1736, with Johnson, he went to London and there studied law for a time. He had always had a leaning toward the stage, however, and in 1741 he appeared for the first time. As Richard III he achieved, under an assumed name, a remarkable success, and from that time his name was associated with the production of Shakespearean plays. Garrick presented these dramas without the barbarisms and crudities which had crept into them since Shakespeare's time and his work constituted a virtual revival of the plays. Hot-tempered and jealous, he constantly made enemies among his colleagues and the critics, but his reputation as an actor remained unimpaired. He wrote a number of plays, of which the best is *The Lying Valet*.

GARRISON, WILLIAM LLOYD (1805-1879), an American journalist and reformer, the founder of the antislavery movement in the United States. In 1827 he became editor of the *National Philanthropist*, the first American temperance journal. With Benj. Lundy, a Quaker, he later started at Baltimore a paper called *The Genius of Universal Emancipation*, and his open denunciations of slave traders led soon to his imprisonment for libel. On his release he started *The Liberator*, a weekly journal in Boston, which he published with the aid of one assistant. In 1832 appeared his *Thoughts on African Colonization*, and in the same year he established the American Antislavery Society. He subsequently visited England, where he was cordially received. Constant threats were made that if he did not discontinue *The Liberator* he would be assassinated, and in 1835 he was saved with difficulty from a Boston mob; but his principles made steady progress until 1865, when the Antislavery Society was dissolved, with its work accomplished. A volume of his sonnets and one of selections from his writings have been published.

GARROTTE, *garroté*, or *garoté*, an iron collar formerly used in Spain and Portugal in the execution of criminals. It was fastened

to a post, in front of which the criminal sat, and at the proper time was placed on the victim's neck. By means of a screw the collar was tightened until the person died of strangulation. With other cruel devices, the garrote has become practically obsolete.

GARTER, ORDER OF THE. See ORDER OF THE GARTER.

GARTER SNAKE, a name loosely applied to a number of different reptiles, which are found in various parts of North America. The best-known species, found from Guatemala to Southern Canada, is about three feet long and is striped with yellow and black. Though its bite is quite harmless, it will rush at a pursuer with open mouth and present quite a terrifying appearance. It brings forth its young alive and watches over them with great care, and it is said that the mother snake will allow her young to run into her mouth for protection until danger has passed by.

GARY, IND., a city of Lake County, at the southern tip of Lake Michigan, twenty-five miles from Chicago. It was established by the United States Steel Corporation with the intention that it should become the home of the largest and most perfect steel plant in the world, and this end has been realized. The site of Gary in 1905 was a waste of shifting sand and scrub oak trees. Building operations were begun in 1906 by the Indiana Steel Company, a subsidiary company of the United States Steel Corporation. Other steel companies and subsidiary corporations, as well as independent companies, followed, and in 1911 there were over a dozen vast mills in the city. Principal among these are the American Bridge Company, the Universal Portland Cement Company, the American Sheet and Tinplate Company, the Gary Structural Steel Company, the Tin and Sheet Mills, Gary Screw and Bolt Company, and the Illinois Steel Corporation, the American Car & Foundry Company and the National Tube Company. There are many enterprises of lesser importance.

The city is served by the New York Central, the Pennsylvania, the Baltimore & Ohio, the Michigan Central, the Wabash and the Elgin, Joliet & Eastern railroads. The Gary schools became famous throughout the world (see below). There is a fine Y. M. C. A., the Gary-Carnegie Library, a city-hall and an auditorium. The city water plant is owned by the steel corporation. The city was named

for E. H. Gary, the steel company president, whose death occurred in 1927. Population, 1920, 56,378; in 1930, 100,426, a gain of 81 per cent. See UNITED STATES STEEL CORPORATION.

Gary School Plan, a Work-Study Play plan of education, commonly known as the Gary Plan, is a program designed for the training of the whole child through an enriched curriculum whereby he has facilities for work, study, and play. This system was organized by William A. Wirt in Bluffton, Indiana, in the year 1900. Since 1907, under his administration, the plan has been in operation and perfected in organization at Gary, Indiana. The school operates on the platoon plan. Platoons alternate hourly. One platoon uses class-rooms while the other platoon utilizes special activity facilities. The school plant is in operation eight hours daily. A teacher's normal load is six hours. The child's day of varied activities is seven hours. The pupil devotes three hours daily to academic training in the conventional book studies; one hour daily to nature study and science; and the other three hours to a combination of special subjects, such as shop-work, music, art, drafting, physical training and play, socializing activities in the auditorium, and other expression activities. Above the primary grades, the work is departmentalized. The school is organized on the unit basis. The unit organization is on a twelve-year basis, and covers all grades from the kindergarten through the grades and high school. This unit school serves all community school needs, including adult use at night. Throughout the twelve years the pupil is afforded many opportunities, as well as more freedom in thought and action than customary in the conventional school. Since 1916, many schools have incorporated special features of this organization into their school program, while others have accepted it in its entirety. The plan is now being used in whole or in part in approximately forty-nine per cent of the cities in the United States with a population of 100,000 or more.

GAS. All matter in the universe exists in one of three states: it is solid, liquid or gaseous. If a solid, it will neither flow nor expand, but will retain its form; if a liquid, it will flow; if a gas, it will expand in all directions, if unopposed. Liquids can be compressed but little; solids, almost not at all; gases may be greatly compressed. Such

great pressure can be exerted upon gases that they will become liquefied (see LIQUID AIR). Solids and liquids are always visible; many gases are invisible, and many are odorless. Among the most common gases lacking visibility and odor are air, oxygen, hydrogen, nitrogen and carbon dioxide.

Although air is a gas, it is not popularly so considered; hence a common statement has referred to gas as "all permanently elastic fluids differing from common air." A better definition is that gas is any substance in an elastic, airlike state. Many gases are combustible, while others cannot be made to burn. Heat expands all gases, and cold contracts them. The density of a gas depends upon the pressure to which it is subjected; any increase in the pressure upon it decreases its volume. Two physicists, Boyle and Mariotte, announced the following law:

The volume of a given mass of gas varies inversely with the pressure to which the gas is subjected [twice the pressure gives half the volume, etc.].

Another law applicable to gases is one announced by Charles, and is called Charles's law.

The volume of gas maintained under constant pressure increases for equal increments of temperature by a constant fraction of its original volume; and this fraction is the same whatever the nature of the gas.

Gases do not obey these laws perfectly, but they are very generally applicable.

The liquefaction of gases is effected by the application of cold or pressure, or of the two combined. For any given pressure there is a particular temperature at which the gas liquefies. At a certain point, however, called by Andrews the *critical point of temperature*, the distinction between liquid and gas appears completely lost. At and above this temperature no pressure that can be applied will convert the gas into the form of a liquid, even though the volume is diminished by pressure so much as to make the density of the gas greater than that of the liquid obtained at lower temperatures. By 1878 all gases had been liquefied.

The power of motion inherent in all parts of airlike matter is accounted for by the *kinetic theory of gases*, according to which a gas consists of an enormous number of molecules moving about with very great velocity. Great as is their number, however, the molecules are sparsely distributed through space, in comparison with their dis-

tribution when the substance is in the solid or liquid condition. A molecule of a gas flying about moves on in a straight line till it meets another molecule, or till it touches a side of the containing vessel. Meeting another molecule, the two turn each other aside, just as two billiard balls when they come into collision are both deflected from their previous paths. Passing thence, each flies on in a straight line till it meets a fresh molecule, and each is again deflected. When the molecules strike on the side of a vessel that contains the gas, they rebound as a billiard ball does from the cushion of a billiard table; and the perpetual shower of molecules that strike and rebound from the sides give rise to the phenomenon of gaseous pressure, just as an umbrella held out in a hailstorm is pressed downward, owing to the numerous impulsive blows that act upon it. When the temperature of a gas is raised the energy of the molecules is increased.

Related Articles. Consult the following topics for additional information:
Gas, Illuminating Gas, Natural Gas Engine

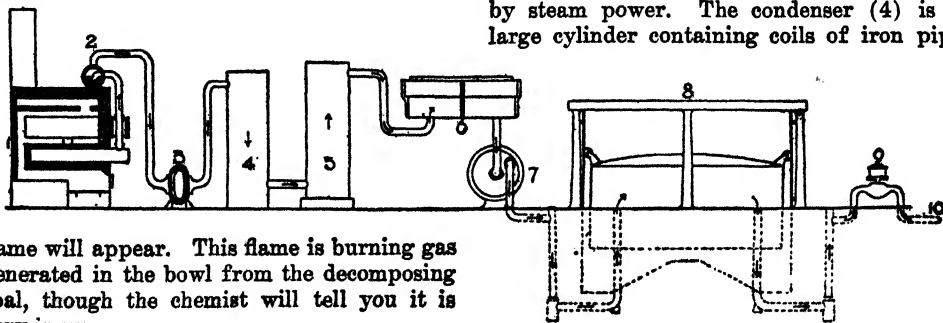
GAS, ILLUMINATING. The gas used in our homes for illumination is made principally from coal, and is called coal gas, but it can also be manufactured from oils derived from petroleum.

Coal gas is formed by the distillation, or decomposition, of coal, by a rather complicated process. Any boy can illustrate the principle in a crude way and prove that gas comes from coal. Fill a clay pipe with soft (bituminous) coal, seal the top of the bowl with wet clay and allow the clay to dry. Put the pipe in a hot fire, with the stem protruding. In a few minutes apply a lighted match to the end of the stem and a

coal, sealed and subjected to great heat. The gas that is formed passes out of the retort through a pipe. It contains such impurities as ammonia, water vapor, sulphur, tar and carbon dioxide, and from it these must be removed by various purifying processes. Then the gas is passed to great storage tanks, ready for use. Pipes from these tanks convey it to streets and homes for lighting purposes.

The Manufacturing Process. The process in greater detail is illustrated in the drawing. The apparatus has the following principal parts: The furnace, 1, containing the retorts; the hydraulic main, 2, into which the gas flows from the retorts; the exhaustor, 3; the condenser, 4; the scrubber, 5; the purifier, 6; the station meter, 7; the holder, 8; the governor, 9; the main, 10. The retorts are made of fire clay and are flat on the bottom and round on the top. They are usually nine feet long, twenty-six inches wide and sixteen inches high and have on the front end a cast iron mouthpiece fitted with a gas-tight door, also a delivery tube through which the gas flows. The retorts hold from 250 to 350 pounds of coal each. They are placed on shelves in the furnace so that the fire will surround them. There are usually six in a furnace. The delivery pipe leads to the hydraulic main, which is a large U-shaped pipe containing water.

The retorts are charged with coal, then closed and heated to redness. As the coal distills, the gas flows to the hydraulic main, where it passes through water and loses some of its tar and ammonia. It is drawn from the hydraulic main and forced through the remaining parts of the apparatus by the exhaustor, which is a large gas pump operated by steam power. The condenser (4) is a large cylinder containing coils of iron pipe

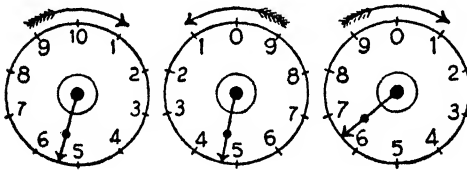


flame will appear. This flame is burning gas generated in the bowl from the decomposing coal, though the chemist will tell you it is very impure.

In the manufacture of gas great retorts are used as the boy uses the clay pipe in the above experiment. The retorts are filled with

through which cold water is kept flowing. As the gas passes through this cylinder it is cooled and loses its tar and water vapor.

From the condenser it goes to the scrubber (5), which is another cylinder filled with coke, brushes, wooden grids or other porous material, over which a shower of water constantly flows. The gas enters the scrubber at the bottom and as it passes up through the cylinder it is brought in contact with the water, which absorbs any ammonia and deposits any tar that may have escaped the condenser. From the scrubber the gas passes to the purifier (6), which is a chamber containing layers of freshly slaked lime or of oxide of iron. These are placed one above the other on floors containing many small openings. As the gas is forced up through the lime or oxide, these compounds absorb any sulphur compounds which it may contain. It is now ready for use and passes through the station meter (7), which measures and records the number of cubic feet passing into the holder (8). The holder is a large cylindrical tank, made of thin iron plates having a dome-shaped top and open at the bottom. It is placed in a cistern of water from which it rises as it is filled with gas. The tank is surrounded by an iron frame, called the *guide frame*, upon the pillars of which guide pulleys run as the tank moves up and down. From the holder the gas passes through the governor (9), which is a device for controlling the pressure, to the main (10), from which it is distributed to the consumer.



FACE OF A GAS METER

The registers show 5,460 feet of gas used.

As gas enters the building in which it is to be used, it passes through a meter which registers the number of cubic feet consumed.

Water Gas. In many cities the gas furnished for illumination is called water gas. It is made by passing steam over red-hot anthracite (hard) coal or coke. The resulting gas is hydrogen and carbon monoxide, and it burns with a hot, blue flame. In that state it is not valuable for its intended use, but must be mixed with gas which emits a yellow flame. This mixture may be coal gas. After mixing, all impurities are removed, then it is stored in tanks, ready for distribution.

Historical. The first man to discover that gas for illumination could be derived from coal was William Murdoch, a Scotchman, in 1792. In 1805 he introduced it into the cotton mills of Manchester, England. It was first used in Paris in 1799, and in London in 1810. It was introduced into the United States at Baltimore in 1821. The next year it was used in Boston, and in 1825 was introduced into New York.

GAS, NATURAL, is gas that has been formed in the interior of the earth. Two theories are presented as to its origin. The first assumes the penetration of the earth by surface water, where it has been subject to chemical action at high temperatures. The second assumes the gas to have originated in the decomposition of organic matter buried in the rock formations of the earth's interior.

The gas fields of North America are extensive. In Canada they are in Alberta and Saskatchewan. In the United States they are widely distributed, and in recent years have been largely and increasingly productive. The States which have the largest gas-field areas and which have been the largest producers are Oklahoma, Texas, California, Louisiana, West Virginia, Pennsylvania, Wyoming, Kansas, Ohio, and Arkansas. The average annual value of the entire production in the United States runs from \$300,000,000 to \$400,000,000.

In the gas-producing areas many uses have been found for it. Wherever it has been found great impetus has been given to manufacturing, for this fuel is cheap and is easily conveyed to the consumer. Its cheapness led at once to wanton waste, on the possible assumption that the supply was inexhaustible; this was later stopped. Wells once were left free to flow for long periods of time. An estimate of the gas wasted in one field in Louisiana in twenty-four hours was 75,000,000 feet, about twenty times as much as is used by the entire city of Shreveport in the same length of time, and about one-thirtieth of the quantity of natural gas used in twenty-four hours by the entire United States. One wild gas-well at Oil City blew off for at least five years. These are but two instances of reckless misuse of a valuable fuel. In many cities where natural gas was furnished to homes for kitchen use the gas was allowed to burn continually in the stoves, owing to its ridiculously low cost. When some fields became exhausted or the pressure in the wells

was greatly reduced, conservation measures were enforced.

How Secured. Natural gas was first found in America when oil wells were drilled. The drills struck vast pockets of gas, which sometimes shot upward with such force as to blow tools weighing 1,000 pounds out of the depths. After finding gas, as soon as possible the exit is capped, and the gas is conducted away from the field in pipes, for distribution to consumers. Occasionally a gushing well will be fired by lightning or by carelessness of workmen; such fires may burn for many weeks before being extinguished.

When the pressure is high the gas will reach the consumer through the pipes, unaided; when it is low, pumps are installed where needed, to force it along. Pipe lines carry gas many hundreds of miles.

GAS, POISON. See POISON GAS.

GASCONY, *gas'kon ni*, an old province of France, north of the Pyrenees Mountains. The Gascons, of mixed Basque and Gothic descent, had the character of being brave, faithful and peculiarly tenacious of purpose, but much given to boasting, whence the word *gasconnade*.

GAS ENGINE. A gas engine is an internal combustion engine in which a compressed gas is exploded in a chamber at the top of an enclosed cylinder with a resulting instantaneous increase in pressure which forces a movable piston, fitted tightly into the cylinder, downward to operate a crankshaft. Most gas engines operate on what is known as the four cycle principle. In the first cycle the intake stroke occurs in which the piston, moving downward, draws gas into the combustion chamber; second is the compression stroke in which the rising piston squeezes the gas into the small area of the combustion chamber; third is the power stroke in which the compressed gas, ignited by a spark, drives the piston downward to do useful work and finally there occurs the exhaust stroke in which the rising piston forces the burned gases out through the exhaust valves. During the intervals between the power stroke and the other three strokes the energy to keep the piston moving is supplied by the momentum of a rapidly moving flywheel.

Gasoline is the favored fuel of internal combustion engines, though types which burn kerosene are on the market. The gasoline

is taken into the cylinders after being mixed with air and reduced to a fine spray, or vapor; this process of vaporization is explained in the article **CARBURETOR**. The vaporized gas is ignited by electric sparks, one at each cylinder head; this explosion raises the temperature of the gas to 1500°, or even 2500° in some engines, causing great expansion in volume, sufficient to drive the piston with a force of several hundred pounds to the square inch. The burned gas escapes through compression vents, and its place is at once taken by new gas. The electric impulse which explodes the gas may be derived from a battery, a magneto or a dynamo. The spark travels through special spark plugs to terminals located at the lower ends of the plugs in the vaporized gas, and it travels, or jumps, from one terminal to the other, thus igniting the gas.

The highest type of gas engines is found in the automobile and the airplane motor. Engines of this kind are also used in motor boats, motorcycles, tractors, etc., and they furnish power for many modern farm necessities, although electricity is rapidly supplanting gas.

GASKELL, ELIZABETH CLEGHORN (1810-1865), a British novelist, daughter of William Stevenson. She married in 1832 the Rev. William Gaskell, a Unitarian minister at Manchester. Her works comprise many novels, among them *Ruth*, *Cousin Phillis* and *Cranford*, this last a classic. Her *Life of Charlotte Bronte* is one of the finest of English biographies.

GASOLINE, *gas'o leen*, a liquid which looks like water but is lighter and is highly inflammable. It is dangerous to handle, for it is exceeding volatile—that is, it vaporizes quickly upon contact with the air. When this occurs the resulting gas may ignite if heated even by so small a flame as a burning match or a lighted cigar. Because of its explosive quality it is the favored fuel for internal combustion engines (see **GAS ENGINE**).

Gasoline is one of the numerous by-products of petroleum. In refining, the process is by fractional distillation. The petroleum is placed in stills and heated, first at comparatively low temperatures, then at higher temperatures. The oils pass off in order of their volatility—that is, their lightness, which means the point at which they will boil and thus vaporize. The first product is cymogene; the second, rhigolene; the third, petroleum

ather; the fourth, the naphthas, then benzine, followed by gasoline, after which the products are kerosene and various grades of oils, such as cylinder oils, engine oils, etc., in numerous grades of lightness. The first three named are little known except to chemists. One hundred barrels of crude oil will produce from five to seven barrels of gasoline of commercial grade, suitable for all kinds of gasoline motors.

The commercial demand for gasoline was vastly increased by the advent of the automobile, the airplane and other transport mediums utilizing gasoline engines as their motive power. In 1899 a production of 7,000,000 barrels more than supplied the market, but in recent years the average annual consumption in the United States alone has been 16 thousand million gallons. This consumption has proved a profitable source of revenue to both Federal and State governments, the state taxes ranging from 2 cents to 7 cents per gallon. The annual revenue from this source amounts to more than half a billion dollars, nearly three-fourths of which is supposed to be applied to the construction and maintenance of State highways. See PETROLEUM; NAPHTHA.

GASTRIC, *gas'trik*, **JUICE**, a clear, colorless, acid fluid, with a salty taste, which has an important part in digestion. It is secreted by the mucous membrane of the stomach. Its most active elements are hydrochloric acid, pepsin and rennin. The first gives the juice its acidity, makes the other two elements more active, prevents decaying of the food, dissolves proteids and softens connective tissue; the rennin curdles milk; the pepsin changes proteids into peptones. Gastric juice does not act on oil or starch. After the food has become thoroughly mixed with the juice of the stomach, it is a thick, sticky substance, called *chyme*, ready to pass into the intestines. The amount of gastric juice secreted daily in the human adult is estimated to be fourteen pounds or more, but as it is continually reabsorbed, there is no great quantity present at any one time.

GASTRITIS, a disease which has its seat in the mucous membrane of the stomach. It occurs in a number of forms. A common one, called *acute catarrhal gastritis*, is accompanied by gas in the stomach, headache, nausea (with or without vomiting), and irregularity of the bowel movements. The stomach should be emptied with a tube or

pump, and laxatives be given the patient. An attack usually yields to dieting and hygienic treatment.

GAST'ROPOD, or **GAS'TEROPOD**, a mollusk belonging to a class of which there are about 20,000 species, including snails, slugs and limpets. They have a headlike extension and move along by means of a disc on the under side of the body. See SLUG; SNAIL; MOLLUSK.

GATES, HORATIO (1728-1806), an American officer during the Revolutionary War, born in Essex County, England. He entered the English army and was with Braddock when the latter was defeated in 1755. On the conclusion of peace he purchased an estate in Virginia, where he lived until the Revolutionary War. Gates was appointed adjutant-general by Congress, with the rank of brigadier-general, and at the head of the American army of the North he compelled the British general Burgoyne to surrender his whole army at Saratoga (1777). The chief credit for this victory belongs, however, rather to Schuyler, Arnold and Morgan than to Gates. In 1780, after the capture of General Lincoln, Gates received the chief command of the Southern districts, but was defeated two months later by Cornwallis at Camden. He was then superseded by General Greene and brought to court-martial, but was finally acquitted and was reinstated in his command in 1782, after the capture of Cornwallis.

GATH, meaning *wine press*, was one of the five royal cities of the Philistines, which, from its situation on the borders of Judah, was of much importance in the wars of the Jews and Philistines. It was the native town of Goliath, and was successively captured by David, Hazael and Uziah, who dismantled it. The site cannot be determined with certainty, but it is sometimes identified with Tell-es-Safiyeh, between Ekron and Ashdod.

GATINEAU, *gah te no'*, a river of Canada, in Quebec province, the largest branch of the Ottawa. It rises in several lakes and flows almost due south, entering the Ottawa nearly opposite Ottawa City. It is not navigable more than five miles above the Ottawa, except by canoes, but its rapid waters are well stocked with fish and are available as water power. Its length is 400 miles.

GATLING, RICHARD JORDAN (1818-1903), an American inventor, born in North Carolina. He showed mechanical skill at an

early age and perfected several machines for the simplification of processes in cotton manufacture. His principal invention, however, was the revolving gun now known as the Gatling gun. This gun had a capacity of 350 shots a minute, and was a remarkable innovation at the time of its invention. See MACHINE GUN.

GAUGE, or **GAGE**, *gaje*, **STEAM** and **WATER**, instruments fixed to engine boilers for registering the force of the steam and the level of the water. The steam gauge consists of a cylindrical metallic box with a dial in front, over which a needle moves. A tube from the boiler connects with a movable piece of metal, which acts against a spring, gauged to indicate the pressure to the square inch in pounds. The higher the pressure, the more the spring is compressed. The needle is connected with the spring by a mechanism which causes it to move over the dial, upon which the pressure is marked in pounds. The water gauge is a vertical glass tube or flat case, communicating above and below with the boiler. Gauge cocks are sometimes used instead of or in addition to the tubes, for enabling the engineer to verify the level of the water. See BOILER.

GAUL, *gawl*, in ancient geography the country of the Gauls, the chief branch of the great original stock of Celts (see **CELTS**). Students of Latin are familiar with the famous description of the country, forming the opening lines of Caesar's *Commentaries*: "All Gaul is divided into three parts," etc. Gaul extended at one time from the Pyrenees to the Rhine and included also a part of Italy. The part on the Roman side of the Alps was called *Cisalpine Gaul* (meaning *Gaul on his side*). Later, the name was restricted to *Transalpine Gaul*, or the country corresponding nearly to modern France.

Migrations among the Gauls about 397 B. C. first bring the Gallic nation into the region of history. Having crossed the Alps, they fell upon the Etruscans, defeated the Romans at Allia (390 B. C.) and sacked and burned Rome. More than a century after the burning of Rome the eastern Gauls made three destructive invasions into Macedonia and Greece. Several tribes settled in Asia Minor, where, under the name *Galatians*, they long retained their national peculiarities. After these migrations the Gauls along the banks of the Danube and in the south of Germany disappeared.

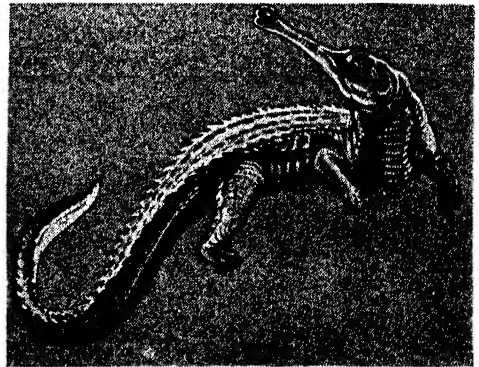
In the years 128-122 B. C. the Romans conquered the southern part of Transalpine Gaul, along the sea from the Alps to the Pyrenees, and here established their dominion in what was called the Province, a name that still exists as Provence. When Julius Caesar was appointed to the proconsulship over the countries bordering on Gaul, he resolved to subject all Gaul and carried out his purpose in less than nine years, 58-50 B. C., in eight bloody campaigns. See CAESAR.

GAUNTLET, *gahn'tlet*, a glove usually made of leather and covered with iron, used by medieval knights. The metal parts were so joined that the hand could open and close. To throw down the gauntlet before an antagonist was a common method of declaring a challenge.

GAUTAMA, *gow'tah mah*. SEE **BUDDHA**.

GAUZE, *gawz*, a thin, transparent cloth of open texture, made plain, figured and striped, and of cotton, linen or silk. Cotton gauze is used extensively for bandages and surgical dressings. Some of the choicest gauze fabrics are made in China, and have silver and gold flowers worked on a foundation of silk. The thin cotton, linen or silk fabrics used in making summer underwear are known as gauzes. Gauze fabrics obtain their openness of texture through a special kind of weaving. The warp threads are twisted in pairs alternately from left to right and vice versa, after each shot of the weft threads. As a result the weft passes through a series of loops in the warp, and the threads are kept the same distances apart.

GA'VIAL, the crocodile of India, charac-



GA'VIAL

terized by the long, narrow, almost cylin-

dricul snout. It sometimes reaches a length of twenty feet. Its teeth, about 120 in number, are of equal length, and its feet are webbed. It feeds on fish and other small prey. The males can be distinguished from the females by the large lump upon the snout, in which the nostrils open. The only living species is found in southern and eastern Asia, especially in the Ganges. See CROCODILE.

GAVOTTE, *gavot'* a musical air for a special dance, consisting of two strains, each of four or eight bars in $\frac{2}{4}$ or $\frac{4}{4}$ time, the starting notes occupying half a bar. Like the minuet, it has been introduced for free treatment into complex musical compositions. The name is said to be derived from Gavot, an inhabitant of Gap, France.

GAY-LUSSAC, *gay lu sak'*, LOUIS JOSEPH (1778-1850), a French chemist, one of the most noted scientists of his day. Perhaps the most important of his many discoveries was his announcement that oxygen and hydrogen unite in proportions of one to two to form water. This led to the discovery and announcement of the law of volumes, which is one of the most important discoveries in the domain of chemistry (see CHEMISTRY). He gave attention to the application of chemical laws and theories to practical purposes. Owing to the great benefits resulting from his labors, Gay-Lussac was the recipient of many honors. He also occupied important educational and government positions and in 1839 was made a peer of France.

GAZA, *gah'za*, PALESTINE, an ancient town located three miles from the Mediterranean Sea and fifty miles southwest of Jerusalem. It was once the most important city of the Philistines, who had conquered it from Egypt. Later it was taken by Alexander the Great, and it was destroyed in 96 B. C.; but it continued a center of Greek culture until nearly A. D. 700. The modern city of Gaza is an important station in the caravan communication between Egypt and Syria. During the World War the place was captured by British troops (1917). Population, 1931, 17,000.

GAZELLE, *ga zel'*, a group of small graceful antelopes, of which there are over twenty species. The color of the back is a light fawn, deepening into dark brown in a wide band which edges the flanks and forms a line between the upper portions of the body and the pure white of the abdomen. The

eye of the gazelle is large, soft and lustrous. Both sexes are provided with horns, which are round, black and about thirteen inches long. Gazelles seem to be confined to the north side of the Atlas Mountains, Egypt, Abyssinia, Syria, Arabia and South Persia. The common gazelle, sometimes called the *ariel*, or *dorcas*, is brown in color. It is easily tamed. Other species are *Loder's gazelle*, *Grant's* and the *Indian chinkara*, or *ravine deer*. See ANTELOPE.

GEARING, *geer'ing*, in machinery, the parts, collectively considered, by which motion communicated to one portion of a machine is transmitted to another. It is generally a train of toothed wheels. There are two chief sorts of wheel gearing, *spur gearing* and *beveled gearing*. In the former the teeth are arranged round either the concave or convex surface of the wheel, and are of equal depth throughout. In *beveled gearing* the teeth are placed upon a beveled surface round a wheel, which, if the slope of the bevel were continued, would form a cone, the teeth sloping similarly. *Spur gearing* is used when the axles of the wheels are parallel, and *beveled gearing* is used when the axles are at right angles to each other.

GECK'O, one of a family of lizards characterized by general flatness of its body and head. The body is covered on the upper part with numerous round warts. The feet are short; the toes, of nearly equal length, are furnished with flattened sucking pads, by means of which the animals can run up a perpendicular wall or even across a ceiling after the manner of flies. It is nocturnal in habits. The animals are common in North Africa and Southern Europe.



GECKO

GEHEN'NA, or **VALLEY OF HIN'NOM**, a valley lying southwest of Jerusalem. It was anciently used as a place of idolatrous rites, where children were sacrificed to Moloch. After the time of Josiah, king of

Judah, it became a depository for sewage and filth. In the time of Christ the word *Gehenna* was synonymous with *hell*, the place of the lost.

GEIBEL, *g'ibel*, EMANUEL (1815-1884), a German poet. He studied at the universities of Bonn and Berlin and lived a year or two in Greece, but from 1852 to 1869 was honorary professor of aesthetics and poetry in the University of Munich. He published several translations from the Greek and numerous original works, including plays and poems. Of the former the most successful were the tragedies *Brunhild* and *Sophonisbe*, and of the latter there were collections of political verse, love-songs and lyrics. His fame rests on his lyrics, which are popular in Germany.

GEIKE, *gee'ky*, ARCHIBALD, Sir (1835-1924), a British geologist, born in Edinburgh. After graduation at the University of Edinburgh he became a member of the Geological Survey of Scotland, of which he was later made director. Having served for eleven years as Murchison professor of geology and mineralogy in Edinburgh, he became director of the Museum of Practical Geology in London. He was elected president of the Geological Society of London and served as president of the British Association for the Advancement of Science. In 1897 he came to America and delivered a series of lectures at Johns Hopkins University. Among his important works are *A Text-book of Geology*, *Ancient Volcanoes of Britain* and *The Foundations of Geology*. Geikie is considered one of the highest authorities on geology. His text-books are used not only in England and the United States, but have been translated into nearly every European language.

GEISSLER'S, *gyes'lerz*, **TUBE**, a laboratory apparatus, named after Heinrich Geissler, by whom the tubes were first constructed. The tube is made of very hard glass and has a platinum wire sealed into each end to serve as an electrode. It is filled with rarified gas, such as nitrogen, oxygen or hydrogen. When the electrodes are connected with opposite poles of an electric machine or induction coil, an electric current passes through the tubes, giving rise to brilliant light effects. Geissler's tubes are made in different shapes and are much used in scientific research. They are valuable for examining various incandescent gases with the spectroscope.

GELATIN, *jel'a tin*, a transparent substance obtained from animal connective tissue, such as skin, hoofs, horn and ligaments. When placed in cold water gelatin forms a jellylike mass, but in hot water it dissolves easily. Gelatin in its purest form is found in the air bladder of the sturgeon; this is one kind of isinglass (which see). It is used in making blanc-mange and jelly, and as a thickener of soups. Glue is made from coarser forms of gelatin, obtained from hoofs and hides; and that from skin and finer membranes forms the "sizing" used in stiffening silks. Gelatin is also utilized in the manufacture of cements and court plaster, in preparing copying pads for such machines as the hectograph, and in photography.

GELEE, *zhel'a*, CLAUDE (1600-1682), a French landscape painter and etcher, generally known as Claude Lorrain. After studying in Naples and Rome, he traveled through Germany and France, then returned to Italy and settled in Rome, where he enjoyed the patronage of the popes Urban VIII and Clement IX. Among his famous paintings are the *Embarkation of Saint Ursula*, in the National Gallery, London; the *Finding of Moses*, in the Madrid Gallery; the *Expulsion of Hagar*, at Munich, and the *Village Dance* and the *Landing of Cleopatra at Tarsus*, in the Louvre, Paris. His pictures are noted for the brilliant effects of light reflected in the sky, clouds and water and for the poetic feeling shown in his interpretations.

GELSEMIUM, *jel se'mi um* or **YELLOW JASMINE**, a shrub of the Southern states, with opposite, lance-shaped, shining leaves and sweet-scented yellow flowers. From the root the drug gelsemium is obtained.

GEMINI, *jem'ini*, a constellation, so named from its two bright stars, Castor and Pollux. The name is the Latin word for *twins*. Gemini is the third sign of the zodiac. The sun is in the constellation of Gemini from the twenty-first of May to about the twenty-first of June. The symbol of Gemini is ♊.

GEMS, *jenz*. See PRECIOUS STONES.

GEMS, ARTIFICIAL. The great value of gems led to their imitation in all ages. The Egyptians, who understood the art of coloring glass, made excellent imitations of the most costly precious stones known to them. The Romans used powdered rock crystal in imitating gems, and their counterfeits were

so successfully made that it was difficult to distinguish them from the genuine article. The alchemists of the Middle Ages also produced excellent imitations of the emerald, ruby, sapphire and topaz.

Modern imitations are of glass, usually known as *paste* or *strass*. This glass contains a large proportion of oxide of lead in its composition, and this makes it remarkably clear and brilliant. It is colored to imitate the most highly-prized precious stones, by the same process that is used in making colored glass (see GLASS). When clear, paste resembles the diamond, but it is soft and can be easily scratched, so that by testing it with a quartz crystal or piece of hard steel, it is easily detected.

Imitations are also produced by using cheaper stones, having close resemblance to the genuine. Clear quartz and white Brazilian topaz, as well as colorless varieties of the sapphire and emerald, are often sold for diamonds. Cheap stones are also colored to resemble carnelians and agates. All of these imitations are skilfully prepared, and one not conversant with the methods of testing gems is liable to be deceived if he makes purchases of unreliable dealers.

Diamonds have been successfully made by chemical process. The product was thoroughly satisfactory, but the stones were all very small and the experiments were attended with so great expense as to make their production impracticable for commercial purposes. In Paris a process is employed successfully in making rubies, and about 5,000,000 carats of real rubies are made there every year.

GENDARMES, *zhahN dahrm'*, the name originally given in France to the whole body of armed men, but after the introduction of standing armies to a body of heavy-armed cavalry, which composed the chief strength of the forces. Gendarmes are now the French armed police.

GENEALOGY, *jen e ah'l'o ji*, the science which deals with the origin and history of families and dynasties. Books of genealogy with lists showing the descent of various families are in the archives of all historical libraries, and are consulted by those interested in tracing their ancestry. Historians find the science of genealogy of great service, especially in their investigations of ancient records. There are several genealogical lists in the Old Testament.

GENERAL, a high military title, bestowed on officers in general command, or high command, of armies. There are four grades—brigadier-general, in charge of a brigade; major-general, at the head of a division; lieutenant-general, a title sometimes not bestowed, but when in commission, given to the head of an army or an army corps; general, ranking every other officer.

The general is next below field marshal in the British and German armies and next below marshal in the army of France. In the United States the rank of general is the highest military honor. It has been held by George Washington, Ulysses S. Grant, William T. Sherman, Philip Sheridan, John J. Pershing, Tasker H. Bliss, Peyton C. March, Chas. P. Summerall, Douglas MacArthur, and Malin Craig.

See, in alphabetical order, the various grades of general referred to above.

GENERAL EDUCATION BOARD, an organization chartered by Congress in 1903, whose function is the distribution of funds donated by John D. Rockefeller for educational purposes. Its principal funds amount to about \$100,000,000; from its organization to the end of 1935 its appropriations exceeded \$175,000,000. Donations are made to advance these lines of work: the promotion of practical farming in the South; establishment of the public high schools in the Southern states; the promotion of colleges and universities in various sections of the country, and of schools for negroes.

GENERAL STAFF, a group of army officers who work out all important army plans. The idea originated in the German army, where the group is called the Great General Staff, and it has been followed in other countries.

The General Staff of the United States army consists of thirty-eight officers, who serve in such capacity for four years and then return to positions of command in the army organization. The Chief of the General Staff is selected from the list of major generals, and while serving as such is given the full rank of general.

GENESIS, *jen'e sis*, the first book of the Bible and of the Pentateuch. The name, meaning *creation*, or *birth*, was applied by Greek translators. For some of the stories in *Genesis*, see BIBLE, subhead *Bible Stories*. *Genesis* consists of two great but closely connected divisions: 1, the history of the crea-

tion, the fall of man, the flood, the dispersion of the human race; 2, the history of the fathers of the Jewish race.

GENET, *sha na'*, EDMON CHARLES EDOUARD (1765-1834), a French diplomat who caused the first international crisis which confronted the American republic. After serving as an attaché of the French embassies at Berlin, Vienna, Saint Petersburg and Amsterdam, and having held other government offices, he was named, in 1793, as minister plenipotentiary to the United States. He was enthusiastically received, but soon brought opprobrium upon himself by securing recruits for France, thus clearly leading the United States to violate its neutrality in the war between France and England. Consequently, President Washington notified him that his activity must cease. He disregarded this warning, however, until his recall was demanded of the French government. Genet, who had allied himself with the Girondists, feared to return to France. He became a naturalized citizen and settled in New York, where he married a daughter of Governor George Clinton.

GENEVA, LAKE OF, or LAKE LEMAN, *le mahn'*, the largest of the lakes of Central Europe, lying on the boundary between Switzerland and France. It has the form of a crescent and is traversed by the River Rhone. Its length is forty-five miles, its greatest width is eight miles, and it is 1,150 feet above the sea. The waters of Lake Geneva are of a beautiful blue color, the scenery on its shores is remarkably beautiful, and the region is visited yearly by thousands of tourists. Near the eastern end is the Chateau which served as a prison for Bonnivard, hero of Byron's *Prisoner of Chillon*. See CHILLON.

GENEVA, N. Y., founded in 1796, is a city in Ontario County, near the geographical center of the state, at the northern end of Seneca Lake. Rochester is fifty miles northwest. The city is on the Seneca & Cayuga Canal and on the New York Central, the Lehigh Valley and other railroads. It has a beautiful location above the lake and is the seat of Hobart College (for men) and William Smith College (for women) and of the state agricultural experiment station. Here is a branch of the American Can Company, and there are also manufactures of optical supplies, cereals and other articles, besides extensive nurseries. It was char-

tered as a city in 1898. Population, 1920, 14,648; in 1930, 16,053.

GENEVA, *je ne' vah*, SWITZERLAND, a city of many historic associations, situated at the western extremity of Lake Geneva, at the outlet of the River Rhone. This stream divides the town into two portions, the larger and more important of which is on the left, or south, bank. Geneva was formerly surrounded by walls and strong fortifications, but since 1850 these have been removed. There are also an upper and a lower town. The former consists of well-built houses and handsome hotels; the lower town is the seat of trade and the residence of the poorer classes. The most important buildings are the cathedral, or Church of Saint Peter (built in the eleventh century); the townhouse; the Musée Fal; and Musée Rath and the university building. Geneva is a famous center for the manufacture of watches, musical boxes and jewelry. It has ample railway communication, and is one of the principal cities through which tourists and travelers enter Switzerland.

In literature and science it has long occupied a distinguished place, and it was the birthplace or the residence of many eminent men, including Calvin, Knox, Le Sage, Necker and Rousseau. In 1919 Geneva was chosen the capital of the League of Nations, by the peace conference, and because of this choice Geneva is often designated the "capital of the world." Until 1936 the League occupied rented quarters, but in that year moved into a specially constructed palatial building. Population, 1931, 142,812.

GENEVA ARBITRATION, the arbitration of a controversy between the United States and Great Britain, growing out of the depredations of the privateer *Alabama* and other Confederate vessels against commerce during the Civil War (see ALABAMA CLAIMS). The tribunal was provided for by the Treaty of Washington in February, 1871.

GENEVA CONVENTION, a meeting of delegates from various European powers at Geneva, Switzerland, in 1864, for the purpose of bringing about an international agreement with respect to the care of sick and wounded soldiers in time of war. It was specified that hospitals and ambulances should be regarded as neutral so long as they had sick or wounded in them; that all persons engaged in caring for the sick and wounded should be regarded as neutral; that

any family which received and cared for sick soldiers should be by that fact absolved from the necessity of quartering troops; that wounded men should be allowed, when cured, to return to their own country on condition of not bearing arms during the remainder of the war; that the insignia of the service should be the distinguishing mark of all ambulances and hospitals, as well as of members of the staffs. The articles of the agreement were subscribed to by every European country and by Persia, but in the World War (1914-1918) were openly and continually violated. See RED CROSS.

GENGHIS KHAN, or JENGHIS KHAN, *jen'gis kahn'* (1162-1227), the first great Mongol conqueror. He was originally named TEMUJIN, but later was called Genghis Khan, a name signifying *great ruler*. He succeeded his father when only thirteen years of age. After much terrible warfare with the Tartars, he was proclaimed khan (ruler) of the united Mongol and Tartar tribes. In 1225 Genghis marched in person at the head of his army against the king of Tangut (South-western China) and totally defeated him. Two of his sons conquered Northern China. At his death his immense dominions were divided among his four sons.

GENII, *je'ni i*, imaginary deities, the ruling and protecting powers of men, places or things. According to the belief of the Romans, which was common to almost all nations, every person had his own genius; that is, he had a spiritual being, which introduced him into life, accompanied him during the course of it and again conducted him out of the world at the close of his career.

The term is applied in the *Arabian Nights* to mysterious spirits who exercised great power for good or evil. Aladdin was assisted by genii who came to help him whenever he rubbed his magic lamp. See ARABIAN NIGHTS.

GENNESARET, *jen nes'sa ret*, LAKE OF. See GALILEE, SEA OF.

GENOA, *jen'o ah*, ITALY, capital of the province of Genoa, and one of the chief commercial cities of the kingdom, is beautifully situated on the northern shore of the Mediterranean Sea, 100 miles southeast of Turin. Encircled by verdure-clad hills and the heights of the Ligurian Apennines, whose summits are crowned with forts and batteries, it well deserves its name *La Superba* (the Proud). Genoa is distinguished, too,

for its architectural beauty, while historically it is famed as the birthplace of Columbus, discoverer of the New World.

The older part of the city is a network of narrow streets that wind up and down the steep hills, but the modern boulevards that encircle or radiate from it are broad and handsome. One of the city squares is the meeting point of all the electric car lines, some of which carry passengers to the suburbs through tunnels. Many splendid palaces and churches give Genoa an aspect of grandeur possessed by few other Italian cities. It has an excellent modern harbor, and exports each year Italy's largest volume of foreign trade.

Under the Romans Genoa was famous as a seaport. After the breaking up of the empire of Charlemagne, it constituted itself a republic, presided over by doges. From 1119 it was almost constantly at war with Pisa down to 1284, when Genoa inflicted a crushing defeat on Pisa. The rivalry between Genoa and Venice was a fruitful source of wars during the twelfth and fourteenth centuries. Meanwhile, the city was disturbed by civil discord and party strife. In 1528 tranquillity was regained, and there was peace until the end of the eighteenth century.

The form of government established was a strict aristocracy. Little by little Genoa lost all its foreign possessions. Corsica, the last of all, revolted in 1730 and was ceded in 1768 to France. In 1797 a democratic constitution was adopted, and the Ligurian Republic was formed. After the Battle of Marengo (1800) Genoa was taken possession of by the French. In 1805 it was formally annexed to the empire of France and ten years later, to the kingdom of Sardinia, with which it has become a portion of the kingdom of Italy. Population, 1931, with suburbs, 608,096.

GENRE, *zhahN' r*, **PAINTING**, a style of painting which has for its subject scenes of every-day life, as distinguished from historical, romantic or other subjects. Genre painting always includes as its dominant note the human element. The greatest masters of genre have been the Dutch, and of these the most distinguished were Franz Hals, Rembrandt, Jan Steen, Ter Borch and Von Ostade. Others who charmingly depicted the common scenes of daily life were Hogarth in England and Valasquez and Murillo in Spain.

GENTIAN, *jen'shan*, a genus of plants having opposite, strongly-ribbed leaves and blue or yellow flowers. The calyx consists of four or five segments, and the corolla has four or five petals. The fruit is a two valved, one-celled, many-seeded capsule. Gentians are for the most part natives of hilly districts. The root is used medicinally. Among the wild species is the beautiful blue fringed gentian of the Northern states.

GENTILES, *jen'tylz*, a term applied in ancient times to peoples other than the Jews. Paul was called the "Apostle to the Gentiles" because he preached to outside races, and the early Church had many more Gentile members than Jewish adherents. At the present time the Mormons designate as Gentiles all outside the Mormon faith.

GENUS, *je'nus*, in botany and zoölogy, a group of species possessing certain characters in common, by which they are distinguished from all others. A genus is of lower rank than *order* or *family*. A single species, possessing certain peculiar characters which belong to no other species, may also constitute a genus, as the giraffe. In naming plants and animals, the generic name is given first, as *Felis leo*. Here the name *Felis* is the generic name and shows that the lion belongs in the cat genus. *Leo* is the specific name. When written the generic name is often abbreviated, as *F. leo*. See **FAMILY**; **ORDER**.



GEOGRAPHY, *je og'ra fi*, the science which describes the earth in its present condition, including the distribution of plants and animals on its surface, and treats of it as the home of man. For purposes of study it is divided into these departments: *physical*, *mathematical* and *political* geography, and *biogeography*. The first is known also by the name of *physiography*. Most authorities add a fifth, *economic*, or *commercial*, geography. The subject

in all its parts is one of the most important branches taught in the public schools, for it is closely related to various other branches of natural science.

In determining the form, measurements and motions of the earth, it depends upon principles and laws discovered by astronomy. In describing the earth's surface and the material of which it is formed, it touches upon geology, and it draws upon botany and zoölogy in its discussion of vegetable and animal life; while in treating of man it depends for many of its facts upon ethnology, and it is also the foundation upon which history largely rests. Nevertheless, geography is not simply a collection of facts obtained from these various branches of science, but it is in itself an exact science, based upon principles and laws which have been discovered by comparing the results obtained from the sciences with which it is so closely related.

Physical Geography, or Physiography. The scientists of the world classify known facts of physical geography from the viewpoint of to-day. The physical history of our planet does not belong here, but is discussed in geology as has been stated. The relations of our earth to other members of the solar system, as well as the measurements referred to above, are treated in astronomy. There is left, then, to be included in physical geography a study of the external appearance of the earth, and the changes wrought in land, water and air; the causes of the seasons and of the tides, the meaning of great earthquakes and of other oft-recurring phenomena.

Mathematical Geography. In mathematical geography man has adapted his carefully developed rules to physical conditions as he finds them. In our lives we find necessity for some knowledge of the simpler mathematical elements of the subject; so under the general term mathematical geography we study the earth as to its shape and its motions, the scheme of its measurement, the changing of its seasons and their length, the alternate rise and fall of the tides, and make graphic representations of all these, which we call maps and charts.

Political Geography. A part of geography is man-made. It is an interesting study to learn what part, and why, and how. In this sense geography and history are united and must be viewed together. The divisions of political geography result from the social and economic activity of the human race, influenced here and there materially by physical conditions. Political geography, then, is that branch of the subject outlining human

governments, treating of boundaries of states and nations and the locations of cities, and pictorially preserving the present day results of the great events of history.

Commercial Geography. Most authorities take from political geography some of its features and shape them into economic, or commercial, geography, which treats of commodities, the world-wide demand for them, transportation, trade routes, etc.

Biogeography. See that title.

An Intimate View. It may be assumed that the student desires quite fully to cover the general subject of geography. He will find it intensely interesting. The world is his home; in men of all tribes and races he should have an interest, and of them should possess some knowledge. He may never have traveled far from the place of his birth, but is free to follow his inclination and mingle in a way with strange peoples and even live among them. Business interests may demand specific knowledge of some far-away corner of the world; the news of the day is best interpreted through positive information previously gained of places and peoples—everything practical in our experience or even within the range of possibility points to the need of precise geographical knowledge. In its study the more intimate view is desired—comparisons and contrasts of things unknown and distant with things which we know and understand. So, if you accept the brief outlines below for plans of study, by investigations based upon local knowledge to supplement what you read you should come to a better understanding of some of the world facts which you have viewed heretofore largely in the abstract. This spirit of personal investigation into relations and conditions finds explanation and partial elaboration in later pages devoted to this subject.

Study by Topics. Promiscuous reading is not to be commended, except in search of important news of the day and in getting the substance of leading magazine articles. When one turns to the serious questions involved in study, time is ill spent except when a definite plan is followed, by which, step by step, the whole of a topic or subtopic is covered. Confining ourselves just now to geography, let us suggest briefly how to arrange reading and study programs, based entirely upon information clearly set forth in these volumes.

The Weather, an Example. No more intimately related subjects may possibly be suggested than those connected with the weather. The topic is not exhausted when you have instinctively turned to the article *Climate* and have mastered it. The foundation only has been laid. Associated with this topic are related articles on *Wind, Rain, Cloud, Weather Bureau, Meteorology*, and the like. If you are ambitious, you will take them in order and become familiar with them.

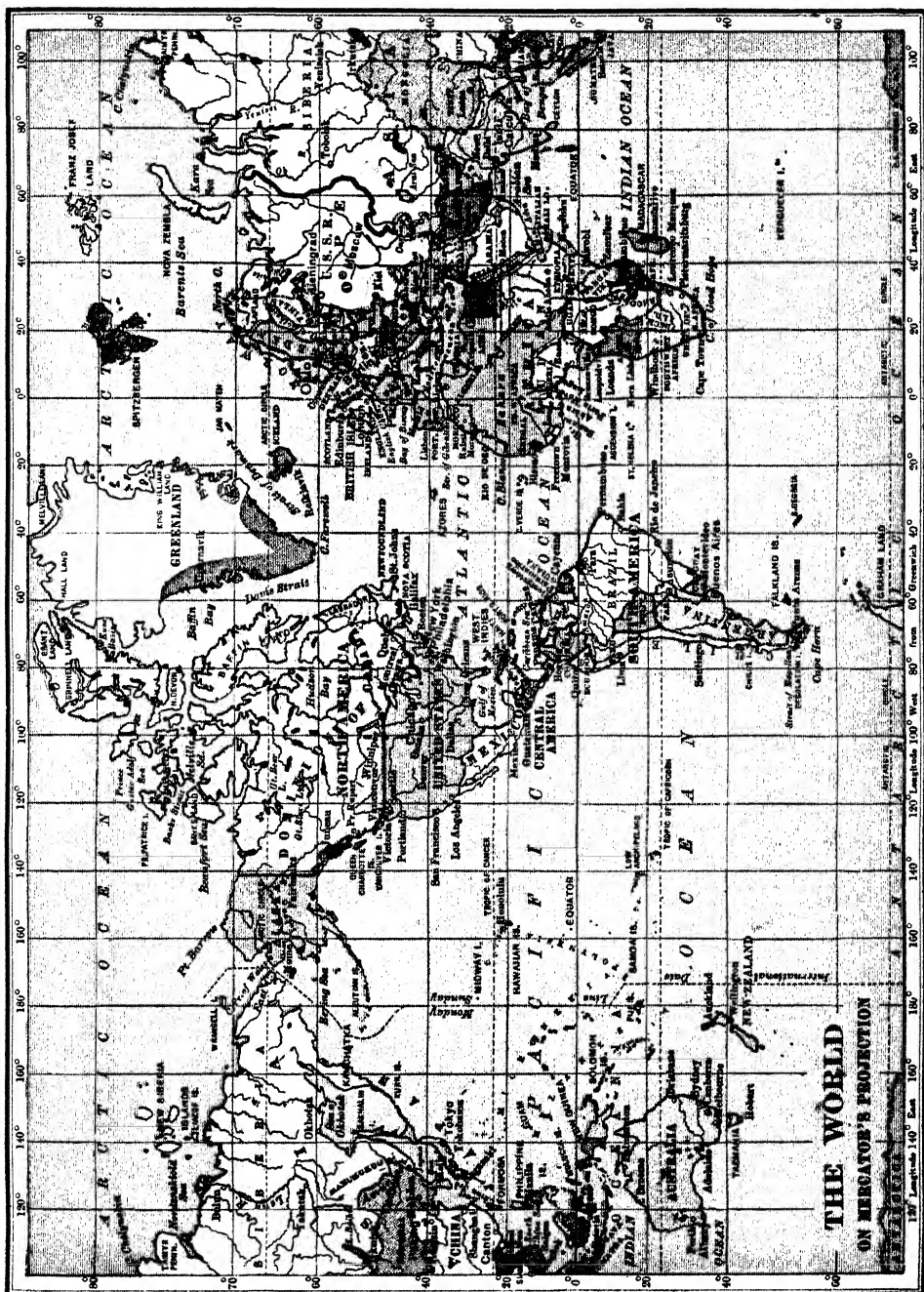
Further, there are various winds, described under their respective titles. As you read, topic by topic, cross-references to still other titles are given, none of which should be ignored. For example, the article *Cloud* contains a reference to *Fog*, in addition to others already brought to your attention. When reading about *Winds* you are referred to *Storms*, and under *Storms* attention is called again to the various severe winds, that no important item may possibly be overlooked by the investigator.

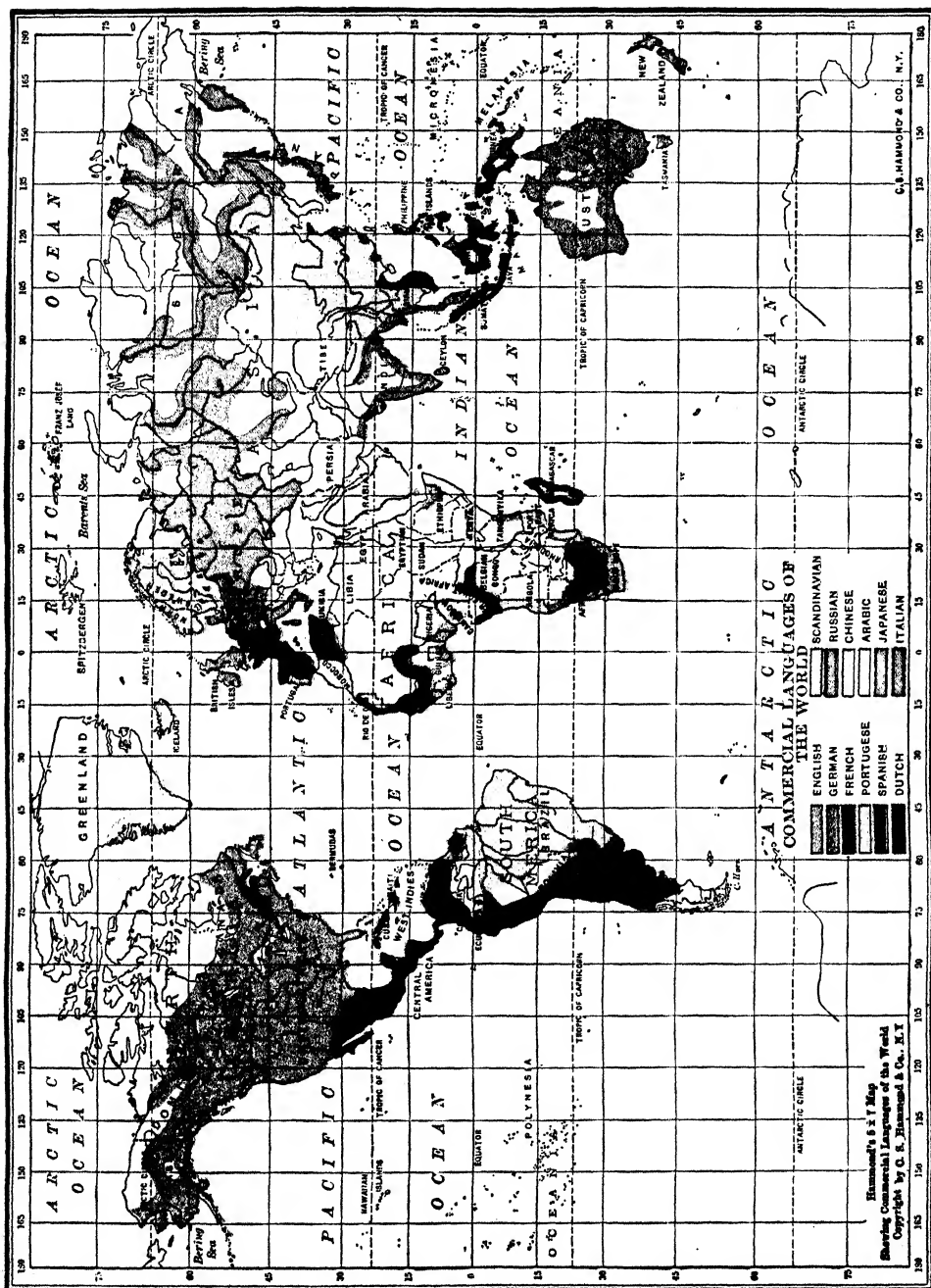
Interest in the subject will doubtless increase with the lengthening of the inquiry. Therefore it is determined to go very fully into every subject dealing with the weather. Under Geography the following topics, alphabetically arranged, are suggested as relating to the investigation at hand:

Atmosphere	Cold Wave
Blizzard	Cyclone
Calms, Region of	Dew
Chinook	Doldrums
Climate	Etesian Winds
Cloud	Frost
Cloud Burst	Fog
Hail	Prevailing Westerlies
Haze	Rain
Horse Latitudes	Rainbow
Humidity	Simoon
Hurricane	Sirocco
Isobars	Storms
Isothermals	Temperature
Khamsin	Tornado
Land and Sea Breezes	Trade Winds
Lightning	Typhoon
Monsoon	Whirlwind
Norther	Wind

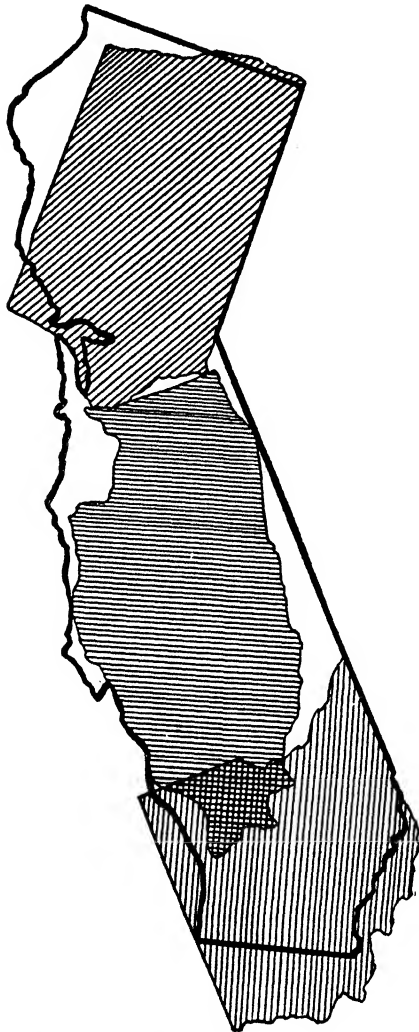
Having the list completed, rearrange it so all winds shall be grouped together, and thus may be studied together, as follows:

Chinook	Simoon
Etesian Winds	Sirocco
Hurricane	Squall
Land and Sea Breezes	Tornado
Monsoon	Trade Winds
Norther	Typhoon
Prevailing Westerlies	Whirlwind





Some topics will bring others to mind which have no relation to geography: *Temperature* suggests *Thermometer*; *Storms* suggest *Barometer*, and these will be transferred to your list. This group of forty-two articles, topically arranged and carefully studied, will give any family circle material



SOME INTERESTING COMPARATIVE
AREAS

for several evenings of profitable investigation, or will provide work in school calculated to give a class a really broad view of this common, yet not generally well-known, subject. The weather is only one of many themes which may be treated in this way with great profit. In no other way can the

ill effects of haphazard reading be overcome.

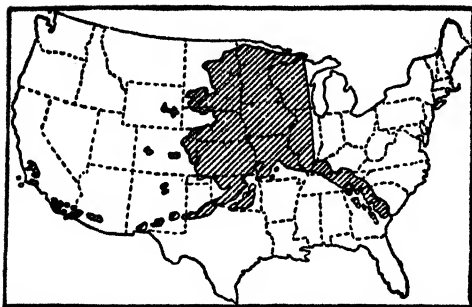
A Study in Areas. We are all advised to see our own country first, the intimation being that most of us do not know very much regarding it, that there are natural objects at home rivaling the great views in Europe, and that it would be embarrassing to a North American abroad to have to admit he knew nothing of some of his home wonder-spots. Millions of men and women, not to mention boys and girls, admit ignorance even of the more commonplace details of home geography. For instance, until we place Ohio, Illinois and Iowa, three of our greatest and richest states, within the boundaries of California, with additional room for almost all of Connecticut, the magnificence of the American republic is not realized. New York is called "The Empire State," but by right of commercial supremacy and wealth rather than of size. Only eighteen states of the Union are smaller; Colorado is larger than two New Yorks and two Delawares, with Rhode Island thrown in for good measure. Alberta is about as large as Texas; Ontario is as large as France and Germany combined; Saskatchewan covers as great an area as the entire Japanese Empire in 1930. Ohio and Iceland are of about the same size, and Nevada is as large as Italy.

With respect to this phase of geography boys and girls study too much in the abstract. More than half of them live east of Indianapolis; they believe Kansas to be a western state, whereas it is in the geographical center of the United States. This fact known, one begins to realize what must lie farther west. Then, too, Kansas may be considered somewhat of an empire itself, as it is sixteen times as large as Connecticut, nearly twice as large as Pennsylvania, and as large as both Kentucky and Tennessee.

Our usual conception of Alaska is that it is a small area at the extreme northwest of the continent. The illustration on page 1464 will correct a false impression. The maps are drawn to the same scale.

Alaska has almost 591,000 square miles. Grasp what these figures mean by a half dozen problems in area similar to those above. Texas is not half as large as Alaska, yet is so large that if France were an island in a sea the size and shape of Texas no farther shore could be seen in any direction.

Problems Without Figures. Attempt to answer all the following questions without



COMPARATIVE AREAS OF ALASKA AND THE UNITED STATES

assistance; then resort to authorities for verification. Some of the facts brought to light will be surprising:

1. A straight line drawn directly south from Chicago would reach how far, if as long as Montana from east to west?

people would be placed in each square mile?

5. Compare England, Ireland, Scotland and Wales in size with Nevada; with Arizona.

6. Is Germany larger than any state of the American Union or of any province of Canada?

Tables for Comparisons. Especially helpful in reaching an understanding respecting comparative areas, density of population and other interesting data are tables like the following. One European country, the United States, Canada and your own state are compared; then in alphabetical order all the countries in a continent are arranged, to be compared with the three above them. This chart may be varied, and the lessons learned from each new compilation will be valuable:

Suggested by the Chart. How does the size and population of French Guiana com-

COUNTRY	AREA IN SQUARE MILES	POPULATION IN ROUND NUMBERS	POPULATION PER SQUARE MILE	MILES OF RAILROADS
France	213,000	40,000,000	188.	25,800
United States	3,000,000	123,000,000	41.3	265,000
Canada	3,600,000	10,376,000	3.	39,000
Illinois	56,000	7,600,000	136.	12,300
Argentina	1,079,965	8,700,000	7.5	22,600
Bolivia	514,000	2,900,000	.17	1,400
Brazil	3,275,500	30,645,000	9.3	18,000
Chile	285,138	3,750,000	15.	5,500
Colombia	441,000	5,900,000	13.3	900
Ecuador	276,000	2,600,000	10.	400
Guiana, British	90,000	300,000	3.	100
Guiana, Dutch	46,000	113,000	2.2	40
Guiana, French	32,000	50,000	1.4	..
Paraguay	61,647	870,000	14.	270
Peru	482,122	5,000,000	10.	2,000
Uruguay	72,000	2,000,000	27.	1,600
Venezuela	352,051	2,400,000	7.	650

2. Draw a straight line through Texas measuring its greatest length. How does it compare with a line similarly drawn through California?

3. Extend such a line from the northernmost point of Maine down through New York City; to what point along the Atlantic coast will it reach?

4. If Chicago's population were transferred to an area the size of New Mexico, how many

people would be placed in each square mile? What percentage of Guiana's population are convicts?

If Brazil's population should suddenly increase five times, how would it compare with that of the United States? Which has the larger area?

Which has more miles of railroad, Brazil or Illinois? Brazil or your own state?

If Canada were as thickly populated as Germany what would be its population?

How many South American countries have a smaller population than New York City? Than Boston? Than Seattle?

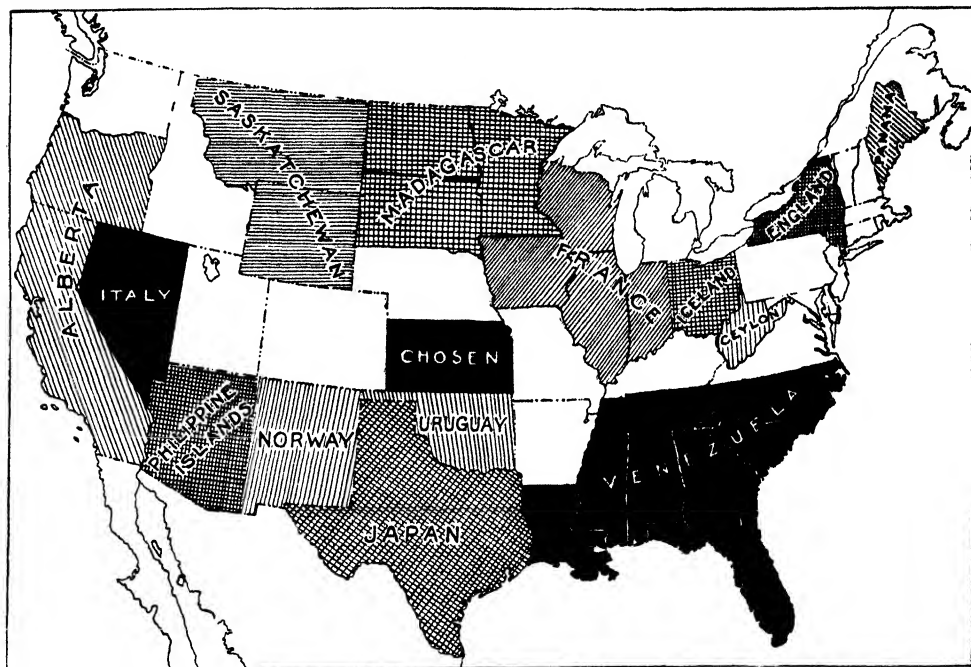
The above suggestions open a wide field to the ingenuity of teachers, parents, and the children themselves. Out of such exercises will come a better understanding of the greatness of our national domain.

Political Divisions. Earlier in this discussion it was stated that political divisions are

pushing Italy's boundary up to the Alps? Did he try to go farther?

5. Locate twenty natural boundary lines between the states of the American Union, and endeavor to find reasons from our history why in some cases arbitrary lines were chosen rather than natural.

Geography Presented by Outlines. In this subject as in every other, it must be kept in mind that successful results are reached only by proceeding from the known to the unknown. The child learns the geography of the yard around his home, without knowing



SOME COMPARATIVE AREAS

almost entirely man-made. In a sense this statement admits of no exceptions, but physical conditions have in many instances influenced man, or have practically determined some things for him. The questions that follow not only explain the statement, but suggest themes on which to base research:

1. As Spain, and France were not destined to be one nation, could the boundary between them reasonably have been placed elsewhere?

2. If the racial characteristics of the peoples to the north and south of the Pyrenees are so different that union would be unwise, are the Pyrenees in the least responsible for the fact?

3. Would the Swedes and Norwegians have been justified in making an arbitrary boundary line between their countries?

4. What man was largely responsible for

that he has mastered the first elements of geographical science. He knows the direction of one object with respect to another and has an idea of relative distances. In play he may imagine the grass area a vast plain; the vines and bushes, trees and forests.

When he goes to school the geography of the schoolyard is to be learned, and if he is in the country, he is soon to know *as geography* the strip of land between home and school. In his geographical plays the brooks are dignified as rivers; the hills become mountains; stretched before him are valleys, plateaus, forests. Such is his introduction to the science of geography. When he is able fairly well to understand distance and elevation he can imagine the contour of a moun-

Wonder Questions in Geography

Do people on the side of the earth opposite us walk upside down?

Since our earth is a ball, the heads of people in Australia, for example, are pointing in exactly the opposite direction from those of people in the United States and Canada. But the Australians are in no more danger of flying off into space than the Americans are, for the law of gravitation operates universally. There are no ups and downs in the universe. No matter in what part of the earth a man may be, it always seems to him that the sky is overhead and the ground below. "Up" and "down" are terms used for convenience, but in the great scheme of the universe they have no significance except as they refer to the center of the earth.

What would be the result if the earth did not rotate on its axis?

Because of the earth's rotating motion some portion of our planet is being shut off from the sun's light all the time. That is, there are alternating periods of darkness and daylight for every portion of the globe. If the earth did not rotate the side facing the sun would have daylight the year round, and the other side would be in perpetual darkness.

Why are day and night of unequal length?

Because the earth's axis is inclined about 23° 30' from a perpendicular to the plane of its orbit. If the axis were perpendicular an imaginary line separating the illuminated side of the earth from the dark side would pass directly through the poles. Exactly half of the northern hemisphere and half of the southern would always be in the light as the earth traveled around the sun, and day and night would always be of equal length in all parts of the globe. But because the earth is tipped and rotates diagonally, the portion of the northern hemisphere receiving light is greater than the portion in darkness, when the northern hemisphere is turned toward the sun, and the dark portion is greater than the light portion when that hemisphere is turned away from the sun. The same conditions are true for the southern hemisphere. Thus the periods of daylight and darkness are subject to considerable variation.

Why do people in the northern hemisphere have their coldest weather when the earth is nearest the sun?

This may sound improbable, but it is true.

The path in which the earth travels around the sun is not exactly circular, and the distance of our planet from the sun therefore varies. It is during the northern winter that the earth comes nearest to the sun. However, the amount of heat which any section of the globe receives depends upon the angle at which the sun's rays strike it. The fact that the sun is nearer the planet at one time than another is not a determining factor, for the variation is not great enough to modify the effect of the rays. During the northern winter the sun's rays fall vertically at points south of the equator, while in the northern hemisphere the rays are very oblique. Direct rays give more heat than slant rays because they pass through less air and are spread over less surface. Thus the northern hemisphere has its coldest weather after the sun has reached the southern tropic.

Why doesn't the earth run away from its own atmosphere?

The atmosphere is an inseparable part of the earth's system, and travels with our planet on its endless journey around the sun. Though the earth revolves at the enormous rate of 66,000 miles an hour, there will never be any danger of its running away from the air.

How far does the atmosphere extend?

No one knows the thickness of the earth's atmospheric envelope, but many authorities estimate it to be between one hundred and two hundred miles. Half of its bulk, however, is within two and one-half miles of the earth's surface; beyond that point it becomes increasingly rare.

Are there mountains in the ocean?

Yes, Cuba and other islands of the West Indies are probably the tops of an oceanic range, and many volcanic and coral islands are peaks of submarine mountains. Sometimes the crests of mountains wholly under water are discovered by sounding operations. However, no mountain ranges like those on land have as yet been discovered on the open ocean bed far from the shores of continents.

What is known of conditions beneath the surface of the ocean?

In the upper parts of the open ocean there are numerous forms of animal life, ranging in size from whales to organisms invisible to the naked eye. Shallow waters nearer shore teem with both animal and plant

life. Here are pastures of moss and gardens of seaweed. On the ocean floor far out at sea there are vast stretches of ooze, made of innumerable tiny shells more or less decomposed. These are the remains of minute one-celled animals that lived in past geologic ages. There are no plants on the deep ocean floors, because sunlight cannot penetrate to those depths, but various forms of animals, many of which are blind, exist there. The ocean between the upper layers and the lowest depths has been described as a cold, quiet, monotonous desert.

Could fish that live in the deepest parts of the ocean exist near the surface, and vice versa?

No, because the pressure at the bottom of the sea is enormously greater than that near the surface. Fish living at a depth of 32,000 feet, for example, are supporting a weight of nearly six tons upon every square inch of their bodies, and they are especially adapted to withstand this enormous weight. If they should swim into the upper layers of water they would burst. Shallow-water fish, on the other hand, would be crushed if they swam into lower depths.

How far is it from the top of the highest mountain to the lowest depth of the ocean?

Mount Everest, the loftiest peak in the world, is 29,141 feet high. The lowest ocean depth, so far as is known, is 34,416 feet below sea level (near the Philippine Islands). The distance between is 63,557 feet, or more than twelve miles.

What is the cause of thunder and lightning?

Lightning is an electrical disturbance. Scientists tell us there are two kinds of electricity, positive and negative; also, that positive and negative charges mutually attract each other. Now when two clouds, or a cloud and the earth, oppositely charged, get so close together that there is an electrical discharge, a shower of sparks occurs. A flash of lightning is in reality a succession of sparks a very small fraction of a second apart. A flash comparatively near one appears as a zigzag line of brilliant light, which sometimes breaks into several branches. This is often called chain lightning. So-called sheet (or heat) lightning is the illumination in the sky of chain lightning which is itself not visible to the observer. Thunder is a result of the sudden expansion and compression of the heated air along the path of the flash. There is pro-

duced a partial vacuum along this line of discharge, and the violent inrush of air into the partial vacuum causes the sound. When the observer is about the same distance from each of the two surfaces between which the discharge takes place, a sudden crash is heard; if the observer is much nearer one end of the path of discharge than the other he hears a prolonged roll, for the sound reaches the ear from different parts of the path at different times. A rumbling roar is often produced by clouds that reflect and hills that echo the sound. As sound travels more slowly than light, the interval between a flash and the accompanying roar is often quite perceptible. When the flash is very near the two may seem to be simultaneous.

What causes the phenomenon known as the "sun drawing water"?

This interesting spectacle occurs when the sun shines through rifts in the clouds. Minute dust particles in the air reflect and scatter some of the light, and mark the passage of the rays.

Does it ever rain angleworms?

No, such a phenomenon has never taken place, though people sometimes believe that there are showers of worms. Everyone has seen the walks fairly well covered with worms after a spring rain, but the shower merely caused the creatures to emerge from their underground burrows.

How can it rain from a cloudless sky?

In this case the precipitation is light and covers only a small area. There is some moisture in the air and there are favorable conditions for its condensation into raindrops, but not enough drops are formed to make a visible cloud.

Is there another side to the rainbow?

No doubt you have often wondered if people on the other side of the rainbow can see it as well as you. When you remember that you always see the rainbow in that part of the sky which is opposite the sun, and view it always with the sun behind you, you will readily see that there is only one side to the rainbow. The rainbow is caused by reflection and refraction of the sun's rays as they fall on drops of rain; each drop acts as a tiny prism and breaks up the white light of the sun into the different colors that we see in the bow. But you can never see the arch of colors when you are facing the sun.

What causes the cracks and chasms in a glacier?

A glacier is a moving mass of ice, whose movements are much like those of a stream. That is, it moves faster at the surface than at the bottom, and more swiftly in the center than at the sides. Because of these differences of movement the ice mass is subjected to a strain that causes its surface to become seared with cracks and chasms, which are sometimes fifty or sixty feet deep. As the break is at right angles to the direction of the strain, the cracks frequently point upstream.

How were the mountains formed?

Nearly all of the mountains are gigantic wrinkles in the earth's crust. They are the result of some tremendous upheaval within the rock mass, which caused the earth's crust to fold or crumple in such a way that huge masses were uplifted. A few mountains are the result of erosion, or wearing away of land areas by wind, water, etc. Sometimes certain areas are so hard that they resist this wearing action, and when the surrounding land has been worn down they stand out alone and form mountains. Other mountains are formed by the eruption of great masses of igneous (heated) rock and other volcanic material. Sometimes there are eruptions of igneous rock that never reach the surface, but which form mountains by bulging up the crust above them.

What causes salt lakes to form? Could a salt lake ever become fresh?

Such lakes are salt because they have no outlets. The water that flows into a lake basin contains various mineral salts in solution. If there is an outlet, water and salt flow off together, but if there is no outlet the salt remains in the lake bed when evaporation takes place. In the course of time the water may become mere brine. Salt lakes have been known to become fresh, when, after a period of drought, the water has disappeared and left the mineral salts deposited on the lake bottom. After a time the salt deposit is covered with a layer of soil brought by the winds, and the lake basin eventually is filled with fresh water.

What is a "lost river"?

These interesting rivers are streams which disappear beneath the surface in parts of their courses, and continue as underground rivers. Usually the stream gets "lost" by plunging into a sinkhole. Such rivers are common in limestone regions;

one of the most notable flows along the floor of Mammoth Cave, Kentucky. Subterranean rivers in Southern California have been brought to the surface for irrigation purposes.

Of what is fog composed?

A fog is simply a cloud near the ground, and is therefore made of moisture which has condensed and become visible. If you should ascend a mountain whose upper slopes are wrapped in clouds you would eventually find yourself enveloped in a mist, and if you went on to the top where the sun had dispelled the mist you would look down upon the rolling clouds you had first viewed from below. People who live in large cities often suffer from aching throats on a foggy day. This is because the fog collects the ill-smelling gases and smoke common to the city air.

What is a mirage?

A mirage is a deceptive appearance frequently seen in deserts and other arid regions. The conditions that prevail in a desert are especially favorable to the formation of a mirage. Here the air near the surface of the ground often becomes very hot, and there is formed a sort of bounding surface between the lower and upper layers of air. The bounding surface acts like a reflecting mirror, in which objects appear as if upside down. A bit of sky may be reflected and seem to the distant observer to be a lake in the desert. Trees are sometimes thus reflected, and travelers, thinking they are seeing the trees imaged in water, form the conclusion that they are approaching an oasis.

What are the "northern lights"?

The scientific name for this beautiful phenomenon of northern skies is aurora borealis. Years ago many people believed that the display was the reflection of sunlight shining on the icebergs in far northern regions. But scientists now believe that the aurora is caused by the passage of electricity through the upper atmosphere, where the air is very rare. The display is probably a form of electric discharge, similar to that produced by a frictional electrical machine. In appearance the aurora is a great arch made up of many streamers or rays of light, varying in color between crimson and pale green or yellow. The rays are constantly in motion and assume an endless variety of shapes.

Where do winds come from?

Wind is simply air in motion. Everyone has noticed that there is an upward cur-

rent over a lamp chimney or an open fire. This is the result of heating and expansion of the air. The expanded air is less dense than the cooler air about it, and so is forced upward as the heavier, surrounding air pushes in. Something of this nature is taking place on a large scale in the atmospheric envelope of the earth. Winds are caused by changes of temperature. When, in any locality, the temperature of the air is raised to a point higher than that of the surrounding air, the heated air expands and is pushed upward by the heavier air which flows in. In the general scheme of circulation we find two great movements taking place: the heated air at the equator is rising and flowing toward the poles, and cooler surface currents are flowing toward the equator.

Why is it generally warmer at the autumn solstice (September 23), when the sun's rays shine vertically on the equator, than at the spring solstice (March 21), when the sun is exactly in the same position?

This question applies, of course, to the north temperate zone. Although the sun has the same position in March as in September, in March the earth is still feeling the effects of three or four months of cold weather, while in September the accumulated warmth of the summer months modifies conditions. For the same reason August is a hotter month than June, though the sun reaches its farthest point north on June 22.

Where on the globe do travelers journeying eastward lose a day, and those journeying westward gain a day?

This occurs at the international date line, which is the 180th meridian. Because of the earth's curvature, sunrise, noon and sunset move continuously westward at the rate of fifteen degrees of longitude every hour. For instance, when it is 7:00 A. M. at New York City it is 4:00 A. M., or three hours earlier, at San Francisco. That is, the sun rises three hours earlier at New York than at San Francisco. The watch of a traveler going westward is therefore gaining time at the rate of one hour for every 900 miles. One going eastward find his watch losing at the same rate. It is apparent, then, that in a trip around the globe one would lose or gain an entire day. For convenience, the 180th meridian has been adopted as the international date line, and ships crossing this meridian drop a day from the reckoning, or add one to it, according to the direction of travel.

How can scientists foretell storms and other weather conditions?

Weather forecasting is done by scientific methods. The procedure of the United States Weather Bureau is typical. There are scattered throughout the country more than 200 observation stations. Every twelve hours the head of each station makes observations of the sky and clouds, reads the barometer to ascertain the pressure of the air, observes the direction and the velocity of the wind, measures the amount of rainfall or snowfall, calculates the amount of moisture in the air, and reads the thermometer. The result of his observations are then summarized, condensed into a cipher message of four or five words, and sent to the proper telegraphic circuit. The messages are all finally collected at the central office in Washington, and are also translated at various forecasting stations along the route. Twice a day the Washington office constructs a weather map showing conditions over the country, and by means of such maps forecasters predict conditions for their own localities and neighboring territory.

Why is snow white?

According to the accepted theory of color, white is a mixture of all the colors of the rainbow. Any object looks white which reflects all colors equally; an object looks red which reflects only the light wave that produces red and absorbs all the others. When vapor is condensed into snow crystals, the flakes have numerous tiny surfaces, each of which acts as a reflector and sends back to the retina of the eye practically all of the sunlight which strikes it. And because these tiny facets reflect all colors and absorb none, the snowflakes look white.

Could anyone make a correct flat map of any part of the earth?

No, such a map is an impossibility, because we cannot flatten out a curved surface without distorting it. Map makers succeed in getting their maps only approximately correct. Some sacrifice form and area accuracy to get the directions correct, some get areas correct but at the same time distort forms, and so on. By one plan of map making all points in the same longitude are in the same vertical line, but a map of the western hemisphere made on this plan shows North America much larger than South America. This is due to the fact that such a method exaggerates east and west distances near the poles, and as North America is broadest near the North Pole, it is all out of proportion on the map.

tainous country, the appearance of a great river, the vastness of the ocean. A great deal of foundation work may be thoroughly done through the medium of local geography, without passing the physical bounds named.

For the best development of a subject an outline is recommended. If the student wishes to study political geography, for example, he will wish to begin with the school district, the smallest political division, and advance to the township, the city, the county, the state, a country, and finally a continent. In these volumes under the various headings named will be found outlines on each of these divisions.

History. The ancients' ideas of the earth were very vague. By them it was generally considered flat or in the form of a shield surrounded by water and covered by the canopy of the sky. The Phœnicians were the first to extend geographical knowledge. It is supposed that they explored the coasts of the Mediterranean, and some believe that they made voyages as far south as the southern part of Africa. The Romans' idea of geography was confined to the Roman world, including the southern part of Europe, northern Africa and western Asia, and these boundaries of geographical knowledge were not materially extended until the Middle Ages. In the thirteenth and fourteenth centuries reports from travelers who had been as far as China and Japan gave the people of Europe some knowledge of that part of the world and prepared the way for the great era of exploration which began in the latter part of the fifteenth century. During this period new ideas concerning the form of the earth were advanced, the southern point of Africa was reached and a water route to India was found. The New World was also discovered. These discoveries led to unusual activity during the sixteenth century. The coasts of the New World, with the exception of those bordering upon the Arctic Ocean, were explored, and the earth was circumnavigated. Following this period of discovery, attention seems to have been given to conquest, and during the seventeenth and eighteenth centuries voyages of discovery were not so numerous. The nineteenth century is noted for the many expeditions into the interior of unknown continents and to the polar regions. By the close of that century Africa, Australia and all other remote lands had been explored, and the only large portions of the earth which

had not been visited were those immediately surrounding the poles.

But the greatest advance in geography made during this period was in the organization of its facts in accordance with the principles and laws which governed them and the placing of geography on a true scientific basis. With the accomplishment of this work, views concerning the scope, purpose and value of geography greatly changed. Instead of being considered a knowledge of unrelated facts, it came to be known as a science, depending upon fundamental principles and laws, which were of more importance to the geographer than the mere facts concerning the size, form, inhabitants and other conditions of the earth's surface. The outgrowth of these ideas has led to the establishment of what is known as the *new geography*, which means geography as studied from a scientific point of view.

Related Articles. In the above subject-matter many related geographical titles are referred to. In addition, the reader will find thousands of others in these volumes. They are too numerous to record here, for fully one-sixth of the set of books is devoted to geography. See, also, titles listed under Physical Geography.

GEOGRAPHY, METHODS OF TEACHING.

The purposes of geographical study should be:

- (1) To give the pupil a knowledge of the most common facts of geography which are found in his immediate surroundings, such as the plants and animals living in his locality and the occupations with which he meets from day to day.
- (2) To lead him to become familiar with the fundamental principles and laws of geography, such as those governing climate and the distribution of life.
- (3) To lead him to apply these laws and principles in determining geographical conditions.
- (4) To lead him to see how these conditions control human activities at the present and how they have affected these activities in the past.

Teacher's Preparation. In order to accomplish these ends, the teacher must be thoroughly prepared for her work. This preparation should include (a) a knowledge of the fundamental principles and laws of the science and ability to apply them to the conditions of her environment; (b) a knowledge of the great facts of geography, such as the climatic conditions of the different parts of the various continents, the effect of mountains upon climate and the characteristic animal and vegetable life of the different regions of the earth; (c) a knowledge of

Methods of Teaching Geography

I. PURPOSES TO BE GAINED

(a) In primary and intermediate grades

- (1) Knowledge of immediate surroundings
- (2) Local plants and animals
- (3) Occupations
- (4) Elementary principles of political and mathematical geography

(b) In grammar grades

- (1) Principles and laws of the science
 - (a) Distribution of animal life
 - (b) Distribution of vegetable life
- (c) Laws governing climate, tides, seasons, etc.
- (d) Political geography

(c) Application of general laws

- (1) To special cases and places
- (2) Exceptions due to local conditions

II. PREPARATION OF TEACHER

(a) Knowledge of subject far beyond point class is expected to study

- (b) Ability to reduce to simple language scientific data of physical geography
- (c) Knowledge of general methods of teaching
- (d) Study of geographical topics in the best teachers' journals

III. AIDS IN TEACHER'S PREPARATION

- (a) Knowledge of correlated subjects
- (b) Reference works on topics of the day's lessons
- (c) Careful reading of current publications

IV. EQUIPMENT

- (a) Globe and wall maps

(b). Indexed clipping file

- (c) Modern text-books for class use
- (d) Supplementary text-books for pupils' reference

V. METHODS BY GRADES

(a) Primary grades

- (1) Make local geography real
- (2) Acquaint pupils with technical geographical names of local objects
- (3) Use of maps
 - (a) Show relative distances and locations locally
 - (b) Make clear that a map is merely a picture on a small scale

(b) Intermediate grades

- (1) Apply general facts from local geography to world conditions
- (2) Model continents from sand, locating river systems, mountains, valleys, with care
- (3) Study cities
 - (a) Size
 - (b) Reasons for location
 - (c) Causes contributing to growth

(4) Text-books

- (a) Endeavor to visualize text, making descriptions seem real
- (b) Basis of imaginary journeys

(c) Grammar grades

- (1) Text-books should be used daily in connection with good reference works
- (2) Compile clippings on geographical subjects
- (3) Make maps from memory, drawn to scale
- (4) Study of types

the more minute facts of her own country, state and town; (d) a knowledge of the principles of teaching.

This preparation can be obtained by the study of standard works on geography, the

elementary works on the different branches of natural science, particularly physics, botany and zoölogy; the reading of books of travel and articles of a geographical nature which are found in newspapers and other

periodicals. In addition to this the teacher should be a good observer, as by careful observation she will be able to verify in her own experience many of the facts gleaned in her reading.

The teacher should be provided with such material as will assist her in the presentation of the subject in such a manner as to make it both interesting and of practical value to her class. To this end she should make collections of pictures, catalogues and circulars of the great railway and steamship lines of the country. She should also collect and arrange a scrap-cabinet consisting of articles cut from newspapers and magazines and of references to articles in periodicals and books from which articles cannot be clipped. All this matter should be systematically arranged and catalogued. The most convenient and inexpensive plan is to place the pictures and clippings in large envelopes, either arranged alphabetically or by continent and country. For united study the latter plan is preferable, since according to such a plan all articles pertaining to the United States would be placed in the envelope headed *United States*, or if a special study were made of her own state the articles pertaining to that would be in an envelope by themselves. This applies also to pictures.

Primary Grades. The work in geography in the first three grades is preparatory to a systematic study of the subject in the grades which follow. In the first and second grades only the simplest geographical facts should be treated. The beginning of this work is in connection with nature study, the geographical element here consisting of calling attention to the localities in which the plants and animals studied are found (see *NATURE STUDY*). In connection with this the study of the weather is helpful and interesting. A good plan for this work is to construct a calendar upon the blackboard or upon a large sheet of manila paper. The calendar should be ornamented with a picture which expresses the prevailing weather of the month. If it is December and the locality is in a cool climate, this picture should show the ground covered with snow and, possibly, children engaged in winter sports. If there is room to make the calendar sufficiently large, it adds interest to this work to characterize the weather of each day by an outline picture, in which some leading event of the day will be brought out.

From the study of plants and animals, the class naturally passes to the study of the most common substances used for food, for clothing and, with the older classes, for building purposes.

The work of the second year should be a continuation of that of the first year; but as this work is expanded the geographical feature should be more strongly emphasized, and the pupils should be led to discover many geographical facts for themselves. This should be done largely by out-of-door excursions, by which pupils may come into personal contact with nature and its phenomena. The work in geography for the third year should be largely home geography. The pupils should study the various occupations in the town or near-by city and should be led to see the reason for each of these and something of their relation to one another. This naturally leads to the study of transportation, and the reasons for carrying commodities from one place to another should be discovered.

Map making should begin this year and should be of the simplest sort, consisting first of a map of the schoolroom, then of the school building and grounds. This line of work should be carefully planned and supervised by the teacher. The idea of scale should be thoroughly fixed in the minds of the pupils, and they should be led to see what a map is and what it represents. The ideas gained from travel can also be profitably introduced in this grade. Some pupils may have taken journeys to neighboring towns and cities and can relate something of what they saw. Imaginary journeys can also be taken, and suitable books of travel can be read by the pupils themselves or by the teacher, at stated times during the day or on a certain day in the week.

In developing the work of the second and third grades, special attention should be given to teaching the pupil fundamental geographical concepts, with their appropriate terms, such as bodies of water extending into the land (bays and gulfs), small bodies of water surrounded by land (pools and lakes), abrupt elevations of land (hills and mountains). This line of work should be extended to cover the fundamental facts of geography, giving the pupil the necessary vocabulary for expressing himself in proper terms when he takes up the formal study of the text-book.

In connection with this, pupils should be taught to read maps properly; that is, to place behind the map symbols the proper mental picture, so that an irregular line (river) shall not represent a mere mark upon paper, but flowing water, containing its appropriate aquatic life, bearing on its bosom the country's commerce and giving to the country through which it flows luxuriant verdure and productive soil.

Intermediate and Grammar Grades.

Fourth grade classes usually begin the study of geography by the use of the text-book, and perhaps more failures in teaching this subject occur at this point than at any other. The reasons for these failures are that the pupils are not suitably prepared for the text-book and that the teacher does not become sufficiently familiar with the scope and plan of the work to introduce the pupils to it in such a way as to enable them to overcome the difficulties attending its use. The first requisite to the successful teaching of the text of a primary geography is a thorough understanding of the book on the part of the teacher; the second is a discovery of the geographical knowledge which the pupils possess. With these facts in mind the skilful teacher can so adjust the class to the book as to remove the difficulties usually met at this stage of the study.

Map making should be carried on during this year and should be extended to include sketches of the natural divisions studied and, in the latter part of the year of the countries. Maps drawn by the pupils should be as simple as possible and should never include more than the most important features. In the main, they should be sketched and the work should be rapidly done, but accuracy of form and proportions should be insisted upon.

The work in the grammar grades is simply a continuation of that begun in the fourth grade. The difficulties to be watched and overcome are those which occur in the transition from the primary to the advanced text-book. Many texts in geography used in the grammar grades begin with a discussion of the fundamental principles of mathematical geography. Such a discussion requires altogether too broad a generalization for pupils of this age and leads to confusion and discouragement and often to a thorough distaste for the subject. Books so arranged should not be strictly followed in plan. If

this part of the work is to be taken at all, it should be considered after the other portions of the book have been completed and the pupils have reached a more mature stage.

Study of Types. One of the most successful plans of teaching geography is by leading the pupils to study types. There are so many facts in geography that only a few can be studied at best, and when some great topic is taken and understood, it becomes an illustration for all other objects of a similar nature, as a study of the Mississippi River leads the pupils to gain a general idea of all rivers. This is true of the study of all the great forms of land and water and of the leading industries. This method of presentation is successful, provided the teacher thoroughly prepares for the work and confines it to the capacity of the pupils. The danger is that too much will be attempted and that the type study will not be logically connected. With care to avoid these dangers, the study of types is one of the most valuable features connected with geography work.

The teacher will find valuable assistance in the following works: Chamberlain's Geography; Physical, Economical, Regional; Huntington and Cushing's Principles of Human Geography; Smith's Industrial and Commercial Geography; Van Loon's Geography.

GEOLOGICAL, *je o loj i kal*, SURVEY OF THE UNITED STATES, a bureau in the Department of the Interior which has oversight of mineral resources, studies geological structure and controls the irrigation of lands which are being opened for cultivation by the government. It was formed in 1879 by the combination of four independent surveys, which for a number of years had been engaged in explorations of the western part of the United States. The bureau is in charge of a director, who is required to submit an annual report of the work done by the Survey to the Secretary of the Interior. These reports are works of great value.

The most important duties with which the Survey is charged are the preparation of a topographical map of the United States, the examination of mineral deposits, the collection of mineral statistics, the study of the water supply of the country, with reference to the development of water power and irrigation of arid lands and the classification of public lands. The topographical map when completed will show the distribution of the rock formations of the country, their

structure and the location of mineral deposits. As fast as completed, this map is issued in sections in folio form. For the purpose of carrying on its different lines of work, the Survey is divided into several sections, among which are those of mining and mineral resources, metalliferous ores, non-metalliferous products and physical and chemical research. In addition to its annual reports, the bureau publishes numerous pamphlets, monographs and maps.



GEOLGY, *je ol' o ji*, the science which treats of the origin and history of the earth. It is chiefly through the study of rocks that scientists have been able to read the earth's story, and consideration of this subject may well begin with the story of the rocks themselves.

How Rocks Were Formed. Whatever theory one may hold concerning the origin of the earth, there is every

evidence that the rocks upon its surface have been formed in two ways—by the action of heat and by the action of water. Those formed by heat are known as *igneous rocks*, and they constitute the oldest and by far the largest part of the earth's crust. These rocks first existed in a molten condition and were solidified by cooling. Granite, gneiss and basalt are good illustrations of rocks of this class.

The rocks formed by water, generally known as *sedimentary rocks*, are found in the lowlands along the shores of bodies of water and on the margins of streams. The lowlands near the mouths of great rivers were also formed in this way. The rain falling upon the sides of the mountains washed loose particles of rock down to the lower levels, and they were carried along by streams, until the force of the current became so slight that the water would no longer hold them in suspension. These particles then settled at the bottom of the stream, forming mud. In the course of time the land was raised, and this mud hardened into rock. Because such rocks were usually formed in layers they are also called *stratified rocks*. In many places the flooding of the earth's crust caused the

stratified rocks to be folded and tilted, so that they do not now occupy a horizontal position as they did when formed. For this reason, also, we find the igneous and stratified rocks intermingled in a confusing manner in many localities. The heat and pressure to which some of these formations were subjected have entirely changed their nature, and they are known as *metamorphic*.

Geologic Systems. The history of the rocks is determined almost entirely by studying the fossils which they contain.

Fossils are the remains of plant and animal life that lived in past geological ages. Since the lowest rock layers are the ones which were first formed, we know that the fossils found in them represent oldest forms of life.

Beginning, then, with the simplest fossils found in the oldest strata, the geologist traces the development of both vegetable and animal life from the remotest period of their existence to the present time, each period in the earth's history being characterized by the unusual development of some form of life (see FOSSIL). Because of this and of the peculiar grouping of the rocks at the time, geological history is divided into a number of eras, each of which includes several formations, known as rock systems. The time during which a certain formation developed is called a period, each era consisting of several periods. The eras and systems here given are those generally accepted by the leading geologists:

Eras	Systems
Cenozoic..... (recent life)	Present
	Glacial
	Pliocene
	Miocene
	Oligocene
Mesozoic..... (middle life)	Eocene
	Cretaceous
	Jurassic
Paleozoic..... (old life)	Triassic
	Permian
	Carboniferous
	Devonian
	Silurian
	Ordovician
Proterozoic..... (earlier life)	Cambrian
	Keweenaw
	Animikean
Archeozoic..... (ancient life)	Huronian
	Igneous Rocks
	Granite
	Slate
	Limestone

Description of Eras. The rock formations of the oldest era, the Archeozoic, are

called *Archean*. No fossils have been found in the Archean rocks, but there are certain deposits which lead geologists to infer that life may have existed even at that remote age. In the Proterozoic Era were formed the famous iron ores of the Lake Superior

of sea plants and animals have been found in the first rock layers, and nothing can be said as to the existence of land life early in this era. No vertebrates of any sort, not even the simplest fishes existed; but there were sponges and starfish and mollusks,



TYPE OF VEGETATION OF THE CARBONIFEROUS AGE

region. In the rocks of this era a few fossils appear, showing that life did exist at that period of time. Nothing is known, however, of the nature of that life.

During the Paleozoic Time life became, gradually, very abundant. Only the fossils

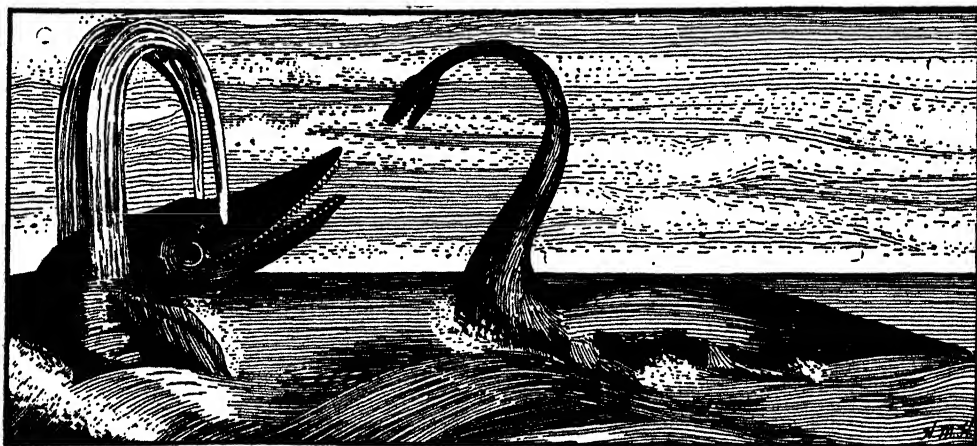
much like our clams or oysters, and worms. Later, in the Devonian Period, the fishes appeared, huge forms related to the sharks. Finally the land, too, began to have life on it; swarms of little insects appeared, and there were snails, scorpions and amphibians.

the first land vertebrates. Fernlike plants of huge size became abundant. Perhaps the most interesting feature of Paleozoic Time was the Carboniferous Period. During this period the greatest coal beds of America and Europe were formed, and it is this fact which has given the period its name; for *Carboniferous* comes from *carbon*, the Latin name for *coal*. The great forests of the earth kept on all through the period, building up layers on layers of black pulpy material which to-day we call *peat*, and which finally hardened into *coal* (which see).

Mesozoic Time is called the Age of Reptiles, and when we read descriptions of the reptiles which lived in those times, we are glad that the period ended before the days

stretch of twenty-five feet. Some of the most terrible were the megalosaurus, a lizard twenty-five or thirty feet long; the ichthyosaurus, which had a long head, a short neck, a thick body and a long tail, and which grew to be thirty feet long; and the plesiosaurus, which had a very long neck, a small head, and four limbs developed like paddles for swimming. Never since Mesozoic Times have there been reptiles in anything like the number in which they existed then.

The last period of time, the Cenozoic, is sometimes divided into two periods, called the Age of Mammals and the Age of Man. In the Age of Mammals all forms of life existed. It is not true that all the kinds of mammals and of birds that existed in the



Ichthyosaurus TYPES OF ANIMALS OF THE REPTILIAN AGE Plesiosaurus

of men. Of course reptiles were not the only forms of life; there were corals and mollusks, as there had been earlier, and modern fishes, such as the salmon and the perch and the herring; there were a few birds with feathers, some of them having teeth set in sockets; and there were a few species of mammals of the lowest orders, relatives of the kangaroo and opossum. But, first and last, there were reptiles, of all sizes and forms. There were reptiles ten or twelve feet in height, which stalked about on two feet; and there were reptiles that walked on all fours, and that had heads over two feet long. There were amphibious reptiles, living partly in water and partly on land, covered with scales like a fish; and there were flying reptiles, like gigantic bats, with a wing

earliest part of the period now live; but many of the lower orders of animals still exist just as they did then. And gradually, with the progress of the years, appeared animals much like the modern hog and rhinoceros and hippopotamus. But it was not until during the Age of Man that all the forms of animal life as they exist to-day finally appeared. Nor are we to imagine that the process of change has stopped; species are still becoming extinct, through man, if not in other ways. The dodo, a strange bird somewhat like a chicken, but much larger, was living in the seventeenth century, but exists nowhere now. The aurochs of Europe is nearly extinct, and our own buffalo bids fair to disappear from the earth.

Origin of the Earth. The question of the



Kaufmann & Fabry

PREHISTORIC ANIMALS IN THEIR NATURAL SURROUNDINGS

Above: The Brontosaurus and Stegosaurus, as they lived during the Jurassic Period.
Below: The carnivorous Tyrannosaurus attacking Triceratops, Cretaceous Period.

earth's origin has never been satisfactorily answered, but there are two theories that have received favorable attention. The *nebular hypothesis*, worked out by La Place, was at one time accepted by many leading scientists. It supposes that the earth is a part of a system that originally was a great mass of nebulous (gaseous) matter. Under the influence of gravitation this mass tended to become globelike in form and to rotate. As it gradually contracted it threw off portions of its mass, and these became the planets. The central parent mass is the sun. Nearly all scientists of to-day reject this theory (see *NEBULAR HYPOTHESIS*), and some accept what is called the *planetesimal hypothesis*.

Planetesimal Hypothesis. This later theory supposes that the earth is a part of a nebula consisting of swarms of small bodies called planetesimals, moving in orbits about a common center. As these bodies revolved they came together and were welded by pressure and heat, forming groups that became the planets, satellites and planetoids. The central mass, as in the other theory, formed the sun. The earth, it is supposed, was originally a small mass of planetesimals which increased to its present size by capturing other planetesimals (see *EARTH*).

Until very recent years, scientists believed that the central part of the earth was molten. It is known that the temperature increases with every foot one descends below the surface, and it was figured that if this heat increased in proportion all the way in, the center must be so hot that it would be fluid. Now, however, scientists believe that while the conditions as to heat are about as they have always believed them to be, the pressure of the earth's crust is so great that the rocks at the center are in a solid condition. Pressure always raises the melting point, and the hottest fluid would be solidified under the weight of the earth's crust. There are molten spots, it is thought, only where the pressure is relieved, as where the crust is uplifted under mountain folds.

Present Changes. The geological forces which have been in operation during all the ages are still at work, and changes in the earth's crust constantly occur. The most important of the forces now effecting these changes are the heat from the sun, the action of water (see *EROSION*), the action of the atmosphere and the disintegration of rocks

Outline on Geology

- I. HISTORY
- II. THEORIES OF ORIGIN OF EARTH
- III. BRANCHES OF GEOLOGY
 - (a) Cosmical Geology
 - (b) Geognosy
 - (c) Dynamic Geology
 - (d) Structural Geology
 - (e) Physiographic Geology
 - (f) Stratigraphic Geology
 - (g) Paleontologic Geology
- IV. GEOLOGIC DIVISIONS OF TIME
 - (a) Archeozoic
 - (1) Oldest igneous rocks formed
 - (2) No fossils
 - (b) Proterozoic
 - (1) Formation of granites, marbles and slates
 - (2) Appearance of fossils
 - (c) Paleozoic
 - (1) Appearance of continents
 - (2) Formation of coal
 - (3) Age of fishes, insects, amphibians
 - (d) Mesozoic
 - (1) Formation of sandstone.
 - (2) Great variety of vegetation
 - (3) Great variety of animals
 - (e) Cenozoic
 - (1) Continents nearly as now
 - (2) Birds, mammals
 - (3) Snow, floods, ice
 - (4) Age of man
- V. GEOLOGIC PROCESSES
 - (a) Making of rocks
 - (1) Part plants and animals have played in rock-making
 - (2) Work of air and moisture
 - (3) Work of winds, water, ice, heat
 - (a) Through expansion and contraction
 - (b) Through fusion
 - (c) Metamorphism
 - (b) Making of valleys
 - (c) Making of hills and mountains

by animal and vegetable life. The action of these forces tends to wear away the mountains and hills and to fill up the valleys. Lakes are becoming more shallow, and many have been changed to dry land within the memory of men now living. The land around the lower courses of rivers is continually rising, as in the case of the Mississippi, and the elevation of the continents is slowly but surely changing, as is shown by the gradual sinking of the eastern coast of North America and of the southern coast of Europe.

Geology and Mythology. We say, sometimes, without realizing that we are using figures of speech, that a volcano breathes out smoke; that the waves are angry; that a mountain lifts its head among the clouds; that the wind whistles; that the clouds threaten. With us, they are only figures of speech, but in the early days such expressions were more than that. The ancient Greeks and Romans lived in a region whose geological features could not be overlooked. It was no flat prairie country, the same to the north as to the south. There were mountains and mountain streams; there were volcanoes and earthquakes; there were chasms and rivers and deep still lakes and the restless, wind-tossed sea. And for all of those things the active minds of the Greeks and Romans had to find explanations. To those ancient peoples everything was alive, not with merely human life, but with the life of gods. A man might blow a basin of water and make little waves upon it; what, then, more natural than that the wind, so like, on a large scale, the blowing-out of a man's breath, should be the breath of some great god?

So they accounted for all the facts in nature which they saw about them. If they rose in the morning and found that the sea had become very stormy during the night and was hurling its great waves up on the shore, they felt that the sea god was angry, and they made offerings to him to buy back his favor. Anything so unusual as an earthquake or a volcanic eruption needed a very special explanation, so they invented histories that reached far back into the past, telling how the gods became angry with some huge giant and buried him under a mountain. His breath was the smoke of the volcano; his struggles to escape caused the earthquakes. A deep chasm or hole in the ground showed where some god had

struck his spear, either in anger or because he wanted to get to the regions below the earth without taking a long way round.

Beginnings of a Science. Now, while such reasons satisfied for a time, it was natural that there should arise wise men who should ask some other explanation for the facts and changes they saw about them. How, for example, did sea-shells come to be imbedded in land scores of miles from the sea? What were the strange objects, some so like plants, some like animals, but all made of stone, which were found in the rock? What, if you found you could not believe that earthquakes and volcanoes were due to the twisting and struggling of a giant under a mountain, did cause those disturbances? Aristotle, away back in the fourth century B. C., wrote a book called *Meteoics*, in which he tried to prove that earthquakes and volcanoes were due to wind inside of the earth. He also declared, with a modernness which rather surprises us, that the land and the water are not just as they have always been; that some of what is now land was once covered with water, and may be again; while land may emerge from what is now the sea. Thus little by little the very beginnings of the science of geology were built up in ancient times.

Geology in the Middle Ages. During the Middle Ages little attention was paid to geology, but after the beginning of modern times, when men began to have a new interest in all the sciences, it came in for its share of study. But just as geology and religion had been mixed up in the ancient days, religion again began to have a connection with the growing science. Geologists declared that it must have taken ages and ages for the rocks to be formed by water; the doctrines of the Church declared that the world had existed for only about six thousand years. And straightway began a struggle between the scientists and the churchmen, the latter insisting that the geologists were attempting to overthrow the Bible. The battle was a long and fierce one; in fact, it is only in recent years that people have come to see that the geologists' statement that the earth has been in existence for a great, great length of times does not deny in any degree the truth of the Bible.

Related Articles. Consult the following titles for additional information:

Algonkian System
Archean System
Basalt

Cambrian Period
Carboniferous Period
Cenozoic Era

Wonder Questions in Geology

How old is the earth?

The age of the earth cannot be given with any degree of exactness, but all geologists agree that it must be reckoned in millions of years, and is probably not less than 100,000,000 years. The earth's story is read chiefly through the study of rocks, and the oldest rocks are known certainly to have been deposited millions of years ago.

What do fossils tell us about the development of plant and animal life?

Fossils are the remains of plants and animals that have turned to stone. They are found embedded in rocks, and they supply some of the best arguments for the theory of evolution. The simplest fossils are found in rocks deposited when the earth was very young, and they show that both plants and animals began as rudimentary organisms. As we read the successive layers of rocks we find the fossils of higher organisms appearing in regular order, until the most completely developed forms appear. We know also from the study of fossils that many forms of life reached a high stage of development, degenerated, and then became extinct. In past geologic ages both plants and animals flourished that would seem of incredible size if they should reappear to-day.

Does coal belong to the mineral or to the vegetable kingdom?

Coal is a mineral, but it is formed through the agency of plant life. Ages before man lived on earth portions of it were covered with dense growths of vegetation. In the course of time these vast forests became covered with water, and for long years they lay buried beneath the ocean's mud. Then the land rose again, and the mud hardened into rock. Upon the surface of this rock soil accumulated, and another growth of vegetation flourished in this soil. The second growth in time sank below the water and was covered, and the heat and pressure attending these changes converted the vegetation into coal. As this process was repeated many times, different veins of this fuel, separated by layers of rock, were formed. Anthracite, or hard coal, probably represents the oldest of such formations.

If all the continents could be leveled off and the material dumped into the seas,

would we have a perfectly smooth globe and the present sea level?

Because the ocean basins exceed the continental areas in extent, and the average depth of the sea is much greater than the average height of land, there is not enough land material to fill those basins. Therefore if the continents were cut down and everything brought to a common level, this level would be about 9,000 feet below the present level of the sea.

Could the North American continent be worn down to sea level?

At all times there are forces in operation tending to wear away the land. These forces are chiefly the rivers, the atmosphere and winds. As a matter of fact, North America is being worn down at the rate of one foot in 9,000 years, and if there were no opposing forces, and this rate continued, the continent would be leveled in about 18,000,000 years. On the other hand, the present rate could not be maintained, for after a long time the forces that tend to level down would become weaker. Streams, for example, would become sluggish and would work less rapidly. There is always a possibility, too, that portions of the continent will be subject to uplift. Thus, though the continent is being worn away, the process will continue indefinitely.

Does the ocean contain volcanoes?

Yes, volcanic action occurs in the sea as well as on land, but we never see volcanic eruptions that take place far below the surface. At the places where such eruptions occur great mounds that may become mountains are built up, and sometimes the tops of these mountains project above sea level and form islands. Much of the sediment found on the sea floor has been furnished by volcanoes.

Is the landscape of the ocean floor as attractive as that of the continents?

There is no comparison between them, for by contrast with the diversified contour of the land the scenery of the ocean is overwhelmingly monotonous. There are, to be sure, elevations and depressions on the ocean bed, but a large part of the sea floor is nearly flat. The reason for this is that the most prominent forces acting on the ocean floor are those which tend to fill up the depressions and thus level off the irregularities. On land, however, forces of erosion tend to make the landscape very diversified.

How do sand dunes move from one place to another?

Sand is easily picked up and carried by the wind, and it sometimes happens that a dune actually moves from one place to another by the removal of sand particles from its windward to its leeward side. Such a dune may be made up to a large extent of the same sand throughout its travels. Dunes sometimes travel into forest areas and bury and kill trees. There are orchards on the New Jersey coast which have been almost completely buried within the lifetime of their possessors. Sometimes dunes that have submerged trees and other objects move on again and restore to view the buried features of the landscape. As vegetation tends to hold sand down, a wandering dune can be checked by letting plants get a hold in the sand.

What were some of the effects of the great ice sheets that once covered part of the earth?

It is probable that these ice sheets, several million square miles in extent, destroyed a great deal of life, and that life is less abundant to-day as a result. The movement of the ice also caused life to migrate. That is, as each great sheet moved forward the plant and animal life in front of its advance had to move on or perish. When the ice retreated these plants and animals found their way back again. The presence of Arctic animals in some of the higher parts of the Appalachian Mountains is an interesting survival of the period when life had to adjust itself to abnormal conditions. The great ice sheets changed the contour of the land considerably. Hills were leveled, lake beds were filled up and scooped out, and masses of rock and gravel were carried along and deposited as drift.

Are lakes permanent bodies of water?

The tendency for all lakes is to disappear in the course of ages, but the process is, of course, slow. The waves beat on the shores, wear off sand, gravel, etc., and deposit this material into the lake bed. Rivers flowing into lakes bear great quantities of sediment and deposit it. Sand and dust are blown into the water continually. The various animals that live in lake waters contribute their portion of deposit through their bones and shells. Dead plant life adds to the accumulation. Lakes with outlets have their level constantly reduced by the unceasing outflow. All of these factors outweigh those tending to keep the water undiminished, and so it can truthfully be said that the life of every lake is doomed. In fact, there

are to-day basins of numerous extinct lakes, and there are many other lakes in their last stages.

Is there ground for believing that the earth will some day be a dead planet like the moon?

This prophecy used to be heard frequently when scientists believed that the earth had a molten interior and was slowly cooling off. A brighter view is taken by most modern geologists. The newest theory of the origin of the earth is that it developed from a gaseous nucleus which gradually solidified by capturing small solid bodies called planetesimals. The central mass grew slowly to the present size of the earth by the capture of other planetesimals, and so the earth was never, as used to be supposed, a hot, glowing body. The heat of the interior, according to geologists who advance this theory, developed largely through pressure. The tendency is to predict a long period of human activity and a much higher evolution spiritually and intellectually.

How were the oceans formed?

If the earth grew by the accumulation of planetesimals, its surface was probably never smooth, but had many depressions. In the course of time the atmosphere of the young earth began to hold water vapor, among other gases, and ultimately the vapor condensed and formed water. This water, accumulating on the surface of the earth, filled its depressions, and so made the beginning of the oceans. We must remember that this is but a theory. No one can say positively how the oceans came to be.

In what sense is man a geologic agent?

With the advance of civilization man has greatly modified the earth's surface. A savage race could live for centuries in a land and its chief features would be undisturbed. But civilized man removes forests, levels down hills, makes artificial lakes, turns rivers from their courses, fills in portions of lake shores, and otherwise changes the landscape to suit his own purposes.

Why do governments organize geologic surveys?

The products of geology are some of the world's most valuable economic products. For example, building stones, coal, natural gas, petroleum, precious metals, salt, fertilizers and many other products come within the field of the geologist. It is therefore a matter of great importance for a nation to survey and classify its geological resources.

Chalk
Clay
Coal
Conglomerate
Cretaceous System
Crystalline Rocks
Devonian Period
Dip
Dolomite
Earth
Eocene Period
Erosion
Fault
Flint
Fossil
Geological Survey
Glacial Period
Gneiss
Granite
Graphite
Gypsum
Hornblende
Igneous Rocks
Jurassic Period
Limestone
Marble
Mesozoic Era
Metamorphic Rocks

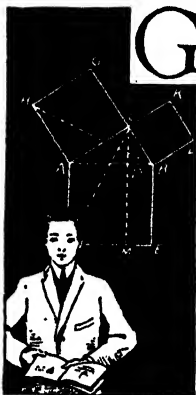
Metamorphism
Minerals and
Mineralogy
Miocene Period
Moraine
New Red Sandstone
Obsidian
Old Red Sandstone
Ordovician Period
Paleozoic Era
Pliocene Period
Proterozoic Era
Quaternary Period
Ripple Marks
Rock
Sand
Sandstone
Shale
Silurian Period
Slate
Soil
Stratified Rocks
Tertiary Period
Trenton Series
Triassic System
Tripoli
Vein

GEOLOGISTS

Bell, Robert
Dana, James Dwight
Dawson, George
Mercer
Dawson, Sir John
William
Geikie, Achibald, Sir
Heilprin, Angelo

Le Conte, Joseph
Lyell, Charles, Sir
Muir, John
Powell, John Wesley
Shaler, Nathaniel S.
Tyndall, John
Van Hise, Charles
Richard

Also numerous articles listed under Physical Geography.



GEOMETRY, that branch of mathematics which treats of the properties and relations of surfaces, volumes, angles and lines. It is a high-school and college subject. The most elementary study of geometry is not attempted usually, until the student has a good working knowledge of algebra.

A *solid* (more correctly termed a *volume*) is a portion of space bounded on all sides, and having

three dimensions, length, breadth and thickness. A *surface* has only breadth and length. It may be considered as the boundary between a solid and all surrounding space or between two unbounded portions of space. A *line* may be considered either as the boundary between two portions of a surface or as an element having indefinite extension in one direction, that is, having but one dimension, length. A *point* is described as that element which has but position, lacking length, breadth and thickness. An *angle* is a portion of space lying between two lines which meet at a point, or between plane surfaces meeting at a point.

Geometry is divided into two great classes, *elementary geometry*, which includes *plane geometry* and *solid geometry*, that is, the study of the properties of planes, lines, angles and of the simple solids; and *higher geometry*, including *analytical geometry*, *descriptive geometry* and *projective geometry*. Descriptive and projective geometry deal with the various relations of forms of geometric bodies, according to a special method, by which figures corresponding to certain points in the body are represented on two perpendicular planes, the relations of the various points composing the body being studied by comparing these two figures.

Methods. The methods of geometry differ in important respects from those used in any other branch of mathematics. Geometry reasons about absolutely abstract relations and constructs theories and systems which can have no possible concrete existence.

Two methods of reasoning in geometry may be distinguished, known, respectively, as *direct* and *indirect*. The former starts from certain self-evident or incontrovertible facts and proceeds step by step to a conclusion, which, provided every step is in accord with pure reason, must be equally self-evident or incontrovertible. The indirect method begins with a supposition which may or may not be true, but which, for the sake of investigation, is assumed to be true. Upon this as a basis, a system using only known truths and demonstrated propositions is built up to a conclusion. If this conclusion accords with some known principle, the original supposition is shown to be sound. If the conclusion evidently disagrees with some known principle, the original supposition is clearly shown to be false. In the latter case the demonstration is said to be *reductio ad absurdum* (a reduction to an absurdity).

Axioms. All geometrical reasoning, whether direct or indirect, depends upon certain fundamental propositions, or axioms, among which may be mentioned the following, established by Euclid as a basis for his *Elements*: (1) Right angles are equal; (2) geometric figures can be moved in space without change of shape or size; (3) magnitudes which coincide with each other are equal; (4) the whole is greater than any of its parts; (5) two straight lines cannot enclose a space. Besides these he assumed a series of so-called postulates, or self-evident theorems, among which are (1) a straight line can be drawn

between any two points; (2) a straight line can be produced to any length; (3) a circle may be described from any center to any distance from that center. These propositions and a few others which have been added from time to time by modern mathematicians are still the foundation of reasoning in geometry.

History. The science of geometry probably began with the Egyptians, but received its first important impetus from Greek mathematicians, among whom were Thales and Pythagoras, who studied triangles and circles, and Plato, who introduced the analytic method of investigation. Then came Euclid, known as the "father of geometry," who not only organized all the facts evolved by his predecessors, but added many new theorems. Of his followers, Archimedes and Apollonius were especially important. After the seventh century A. D. a period of stagnation in mathematical science set in, which was not ended until the sixteenth century, when the work of great mathematicians led to the application of more general methods of study and demonstration in geometry and especially to the introduction of algebraic formulas. Then followed Descartes, who extended the application of algebraic methods and laid the foundations of modern calculus. Little further progress was made until the nineteenth century, when branches known as descriptive geometry and projective geometry were differentiated from the original subject.

GEORGE, DAVID LLOYD (1863-), a British statesman who became Premier of Great Britain during the most critical period in modern English history. He was the first Britisher from the middle classes to attain that office, and his appointment, occurring in the midst of the World War, was in recognition of the fact that England needed at the head of affairs its strongest statesman. He was born in Manchester, where his father, a Welsh schoolmaster named William George, was living in poverty. Left fatherless at the age of two, David was sent by his mother to Wales, and was there brought up by an uncle, a Baptist shoemaker. In his boyhood he took his mother's family name as a middle name and thereafter always called himself Lloyd George. Always a fighter, he became known while in his youth for his fiery insistence on the disestablishment of the English Church in

Wales; by the time he was twenty-seven he had won a favorable reputation as a lawyer and had been sent to Parliament by the Liberals (1890).

For ten years nothing unusual was heard of him, and then came the Boer War. Lloyd George was one of the few Liberals who openly opposed that war, and this he did with a zeal that made him the most unpopular man in England. Later his point of view was given just consideration, and respect for his honesty, fearlessness and independence increased.

His first Cabinet position, that of President of the Board of Trade in Campbell-Bannerman's Ministry, was tendered him in 1906. Two years later he became Chancellor of the Exchequer in the Cabinet of Herbert Asquith, and for five years he and that great Liberal were identified with the most advanced movements that had ever been agitated in England. After disposing of the old-age pension bill, Lloyd George introduced, in 1909, a radical budget providing for great social reforms. Then ensued a bitter struggle between the Lords and Commons, as a result of which the titled House lost its absolute power of veto. That England to-day is ruled by the House of Commons is due directly to the fighting Welshman.

Other reforms followed, and in 1913 came a proposal to equalize land rights. Before this movement was fully on its way the World War broke out, and internal reforms had to be postponed. Lloyd George was made Minister of Munitions in May, 1915, in the coalition Cabinet, and he not only organized his department, which was newly created, but he made it so efficient that the announced program of the War Department was multiplied by sixteen. In June, 1916, he succeeded Lord Kitchener as head of the War Department, and in December of that year, on the resignation of the Asquith Cabinet, he was appointed Premier.

As head of the government Lloyd George had many difficult situations to face. When no favorable decision in the war was reached he was subjected to bitter criticism, from pacifist and military factions alike. Every crisis, however, he faced with decision and courage, and at the same time encouraged many notable reform measures, including extension of the franchise to women and an educational bill making the school system

more democratic. A great munitions strike in 1918 he settled by threatening to induct all strikers into military service. He won a signal victory in the House of Commons in connection with the appointment of General Foch as generalissimo of the allied forces, when he asked for and received a vote of confidence on the question of unified military control. In the general Parliamentary election of December, 1918, the coalition government of Lloyd George won an overwhelming victory, and in January, 1919, he again assumed the duties of Prime Minister. In October, 1922, following criticism of his foreign policy, especially in the Near East, he resigned, and the king appointed Andrew Bonar Law to succeed him as Premier.

GEORGE, LAKE, one of the most beautiful lakes of the United States, situated in New York, south of Lake Champlain, with which it is connected. It lies at the foothills of the Adirondack Mountains, has numerous small islands, very clear water, and is a popular summer resort. The lake is about thirty-three miles long; its greatest width is three miles. The name was given in honor of King George III, in 1775. The site of the Battle of Lake George, fought by French and Indians on September 8, 1755, is now included in Battle Park Reservation, a state park.

GEORGE I (GEORGE LOUIS) (1660-1727), king of Great Britain and Ireland and elector of Hanover, was, through his mother, the great-grandson of James I of England. He was the first of the German Georges to rule over the English, and he could not speak the language of his subjects. In 1682 he was married to Sophia Dorothea of Zell, whom, in 1694, he divorced. In 1698 he succeeded his father as elector. He commanded in the imperial army during the War of the Spanish Succession and won considerable distinction for his bravery. In 1701 he was declared heir to the British crown, and he ascended the throne on the death of Queen Anne in 1714. George I was very unpopular with his British subjects, by reason of his lack of sympathy with England's traditions and ideals.

GEORGE II (GEORGE AUGUSTUS) (1683-1760), king of great Britain and Ireland and elector of Hanover, the son of George I. He married an intelligent German princess in 1705. In 1727 he succeeded his father on the English throne but inherited to the

full his father's predilection for Hanover and dislike of the English. For over thirty years this member of a German house held sway over imperial England. The Seven Years' War, during which occurred the conquest of Canada, and the exploits of Clive in India, which furthered the growth of the British Empire there, are among the chief events of his reign.

GEORGE III (1738-1820), king of Great Britain and Ireland, succeeded his grandfather, George II, in 1760. In the following year he married Princess Charlotte Sophia of Mecklenburg-Strelitz. The young prince was the first of the Georges to be given an English education, and this made him more popular than his predecessors had been. The sixty years of his reign were filled with great events, among which were the Wilkes controversy; the American Revolution; the French Revolution; the Napoleonic wars, which followed, and the Irish Rebellion of 1798. In 1810 the king's mind, which had already given way several times, finally broke down, and from that time to his death his son, later George IV, governed as regent.

GEORGE IV (GEORGE AUGUSTUS FREDERICK) (1762-1830), king of Great Britain and Ireland, son of George III and the princess Charlotte of Mecklenburg-Strelitz. In 1811 George became regent on account of his father's insanity, and, on the death of George III in 1820, he became king. The most important event after his attaining the throne was the passing of the Catholic Emancipation act, by the Wellington ministry in 1829. He left no descendants and was succeeded by his brother, William IV.

GEORGE V, GEORGE FREDERICK ERNEST ALBERT (1865-1936), king of the United Kingdom of Great Britain and Ireland, and emperor of India, the second son of Edward VII, was born at Marlborough House, London, June 3, 1865. It was not then considered likely that he would become the ruler of the empire, for he had an elder brother, Albert, Duke of Clarence. At the age of twelve, with his elder brother, he entered the navy as a cadet. Here for two years the princes were subject to the same discipline and drill as their shipmates with whom they messed. In 1879 they began their first long voyage. The following year Prince George was promoted to midshipman. This was but a beginning in the prince's advancement in his naval career.

In 1884 he became sub-lieutenant and the following year full lieutenant. In 1889 he was given command of a torpedo boat during the naval maneuvers. In 1890 he visited Canada and the West Indies.

In 1892 Albert, Duke of Clarence, died and George became heir-apparent to the throne. As the direct heir he became Duke of Cornwall and of York. The following year he married Princess Mary of Teck, the ceremony taking place in the Chapel Royal, St. James, July 6. Six children were born to the royal couple—Prince Edward Albert, born 1894 (Edward VIII); Prince Albert Frederick, born 1895 (George VI); Princess Victoria Alexandra, called Princess Mary, born 1897; Prince Henry William, born 1900; Prince George Edward, born 1902, and Prince John Charles (1905–1919).

In March, 1901, the Duke and Duchess of Cornwall and York began a journey around the world in the battleship *Ophir*. They were in Australia during the opening of the first Parliament of the Commonwealth, and also visited New Zealand and Tasmania. They then proceeded to South Africa, India and Canada. While in the Dominion, Prince George made an intensive study of Canadian resources.

On the death of Edward VII, May 6, 1910, Prince George succeeded as George V. He had been well trained for the kingship, both by his years in the navy and by association with his father in many official duties. His reign was marked by such outstanding events as the World War; the settlement of the Irish Question; and the formation, within the Empire, of the British Commonwealth of Nations, with six self-governing dominions (1926), including the Irish Free State. George V was succeeded in January, 1936, by his oldest son, Edward VIII (reigned Jan.-Dec., 1936).

GEORGE VI (1895–), king of Great Britain and Ireland and emperor of India, succeeded to the throne in December, 1936, on the abdication of his brother, Edward VIII. He is the second son of George V. As Prince Albert he was trained for the navy at Osborne and Dartmouth, and was on duty with the fleet during the World War. He later became an officer in the Royal Air Force. In 1920 Prince Albert was created Duke of York and, having retired from active duty, entered Cambridge University to study history and economics. In 1923 he

married Lady Elizabeth Bowes-Lyon, daughter of the Scottish Earl of Strathmore. Their two daughters are Princess Elizabeth, Heir-Presumptive, and Princess Margaret Rose. The coronation of George VI and Queen Elizabeth took place in London on May 12, 1937. See EDWARD VIII.

GEORGE I (1845–1913), king of Greece, second son of Christian IX of Denmark. In 1863 he was elected king by the Greek National Assembly. In 1867 he married the Princess Olga, a niece of the Russian Czar. His conduct as a constitutional monarch was always wise and firm, and he won popular sympathy by his efforts to expand Greek territory. At the close of the Balkan wars in 1913, which left his country victorious, he was assassinated at Salonika. His successor was his son Constantine, whom the allies forced to abdicate during the World War.

GEORGE II (1890–), two times the king of Greece, the eldest son of Constantine, the troubled king who was twice forced to abdicate the throne of his country. The return of George restored the royal house established in 1863, when by invitation Prince William of Denmark ascended the throne as George I.

During the reign of his father Constantine, George was crown prince. Father and son were exiled upon the former's first abdication (1917); both were too friendly to Germany (the World War was in progress), for the queen was the sister of the German emperor. Alexander, George's younger brother, was called to the throne, but he died in 1920, and Constantine returned, but he was forced out again in 1922, and the son came to the throne as George II. The people formed a republic and exiled George in 1924, and he went to London to live. Upon the overthrow of the republic in 1935, he was restored.

George, during his father's restoration in 1921, married Princess Elizabeth of Rumania. She divorced him during his English exile.

GEORGE, HENRY (1839–1896), an American political economist, born in Philadelphia. He went to California when a boy, found employment as a printer and became eventually an editor. In 1879 he published *Progress and Poverty*, in which he promulgated the "single tax" theory (see SINGLE TAX). His works include various treatises upon the land question, the *Science of Political Economy and Protection or Free Trade*.



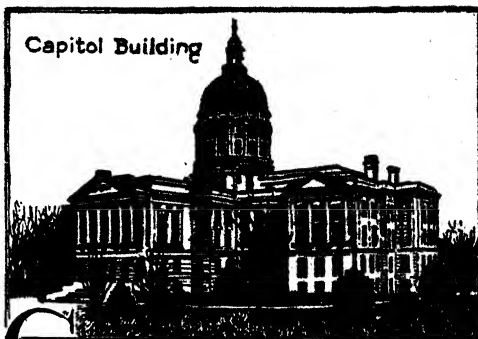
GEORGE VI

GEORGE, SAINT (?-303), the patron saint of England, of whose life little is known. Legend says he was born in Palestine and educated at Cappadocia, and that he suffered martyrdom there. He was held in reverence by the English crusaders and was adopted as the tutelary saint of England in the time of Edward III. He also became the patron saint of Russia and Portugal. The red cross of Saint George on a white ground, formerly worn by all the English soldiery, now survives in the Union Jack. The legend of Saint George's combat with the Dragon was probably an invention of the Middle Ages.

GEORGE ELIOT. See **ELIOT, GEORGE**, in alphabetical position in these volumes.

GEORGETOWN UNIVERSITY, founded in 1789, and incorporated in 1844, is located in Washington, D. C. The University consists of the College of Arts and Sciences, situated on Georgetown Heights, the School of Medicine, the School of Law, the School of Dentistry and the School of Foreign Service. The College comprises three distinct departments: The Graduate School, the Undergraduate School and the Observatories. The College grounds cover 78 acres. The Seismological Observatory, founded in 1911, has a world-wide reputation for its reports of seismic disturbances. The Riggs Memorial Library contains 215,000 volumes. The faculty numbers 360, and the student enrollment is about 2,500.

GEORGE WASHINGTON UNIVERSITY, THE, located in Washington, D. C., was originally chartered in 1821 as the Columbian College in the District of Columbia. By act of Congress, the name was changed to the Columbian University in 1873, and by an act passed in 1904 it became the George Washington University. Under this act the university was made nonsectarian and given power to organize colleges for carrying on educational work in arts, sciences and liberal and technical knowledge. The University comprises twelve colleges, schools and divisions, including the Junior College; Columbian College, the senior college of arts and sciences; the Graduate Council; the School of Medicine; the Law School; the School of Engineering; the School of Pharmacy; the School of Education and the School of Government. The institution is maintained chiefly by tuition fees and by voluntary gifts. There is a student enrollment of more than 5,500, and a faculty of 450.



GEORGIA, *jaw' gi a*, one of the great commonwealths of the Southern United States, its importance being suggested by its popular name, **EMPIRE STATE OF THE SOUTH**. It touches the Atlantic Ocean between South Carolina and Florida, and has one great ocean port, Savannah. The area of the state is 59,265 square miles, which is over 10,000 miles greater than that of New York, the original "Empire State." Georgia ranks twentieth in size among the states. It has the distinction of being the largest state east of the Mississippi River. In 1930 it contained 1,836,974 white people and 1,071,532 negroes, a total of 2,908,506. The state ranks fourteenth in population.

Cities. In 1930, according to the census report, there were nine cities with populations exceeding 15,000. The first five, in order of size, are Atlanta, the capital (270,366); Savannah (85,024); Augusta (60,342); Macon (53,829), and Columbus (43,131).

People and Education. In no other state is there so great a number of negroes, although the number in proportion to the entire population is greater in Mississippi. In Alabama the whites exceed the negro population by 740,000; in Mississippi there are about 20,000 more negroes than whites. The illiteracy of the Georgians is 9.4 per cent, but this is due to the great number of black people; illiteracy among the white population is only 3.3 per cent. Conditions are rapidly improving, for there are now two-thirds as many colored children as white in the public schools.

The public school system is under the general direction of a state superintendent of schools and a state board of education. There is a school fund in excess of \$10,000,000,

raised yearly by local taxation, and a state appropriation of \$4,500,000 each year. General interest is taken in education, and the schools throughout the state are being brought to a higher degree of excellence from year to year. There were in the year 1936 more than 415 white high schools and 37 negro high schools accredited by the Georgia state department of education and by the University System of Georgia.

Since 1932 the University System has been under a board of regents appointed by the governor; this body has control of higher education. The system is composed of sixteen units, the most important of which are the University of Georgia, Athens; the Georgia School of Technology, Atlanta; and the Georgia State College for Women, Milledgeville. There are also numerous secondary schools and colleges throughout the state for both white and colored students, supported by religious denominations.

Surface and Drainage. A triangular section in the northern part of the state having an area of about 6,000 square miles is crossed by the Blue Ridge, the Cohutta, Taylor's Ridge and other ranges of mountains, which extend in a northeast-southwest direction. All of this section has an altitude of 1,000 or more feet, but there are no high peaks among the mountains, the highest not reaching 5,000 feet. Lookout Mountain, famous for its scenery and for famous battles of the Civil War, is partly in Georgia and partly in Tennessee. This entire region is interspersed with hills and valleys, and is noted for the beauty of its scenery. In the extreme northwestern part of the state is located Chickamauga National Park, which is surrounded by hills and low mountains. To the southwest of the mountain region are the foothills, which extend for about sixty-five miles and form a section of country diversified by low hills and broad valleys. This is a portion of the Piedmont region, which extends southward through the Carolinas. To the south and east of the Piedmont is the coastal plain, which occupies fully one-third of the state. The surface of this region is low and level. Off the coast are a number of large islands, with low surface and fertile soil.

Along the Fall Line, where the Piedmont region descends to the coastal plain, are rapids or falls in most of the streams; the location of such towns as Augusta, Milledge-

ville, Macon and Columbus is accounted for largely by this fact, since the fall of the rivers furnishes excellent water power.

Georgia's drainage system comprises the whole or part of nine river basins, and the state contains an unusual number of large rivers. The extreme northwestern part is drained into the Tennessee. To the east and south of this system is the basin drained by the Coosa, formed by the junction of the Ostanaula and Etowah rivers. Lying southeast of these rivers is the valley of the Chattahoochee, through which the river flows diagonally across the state in a southwesterly direction until it reaches the western border, when it turns southward and forms the southern half of the western boundary. As it enters Florida it is joined by the Flint, the united streams being known as the Apalachicola.

The Flint River flows southward through the western part of the state and is approximately parallel to the Chattahoochee through the greater portion of its course. The Ocmulgee and Oconee rise south of the Chattahoochee and flow southeasterly, uniting to form the Altamaha, which conducts their water to the Atlantic. The Altamaha is navigable to the junction of the rivers by which it is formed, a distance of 300 miles. South of the Altamaha is the Satilla, flowing into the Atlantic and the St. Mary's, which forms a part of the boundary between Georgia and Florida. The Savannah, with its extension, the Tugalo, forms the boundary between Georgia and South Carolina, and is navigable to Augusta, 300 miles. Many of these rivers furnish excellent water power.

Climate. The northern half of the state is characterized by a mild and salubrious climate. The winters are not cold, nor are the summers extremely hot. The mean January temperature in the north is 40°, and the January mean in the southeast is 55°. In the coastal plain the summers are hot, and along the coast, especially where the land is marshy, malaria and fevers are likely to attack those who are not acclimated. The middle portion of the state has an equable climate, somewhat warmer than that in the northwestern part. The rainfall varies, being heaviest in the mountain region, but its average is about forty-nine inches for the entire state.

Mineral Resources. The mountainous region has some minerals, the most important



COTTON FLOWER



APPLES



PEACHES



FISH



COWS



SUGAR CANE



TOBACCO



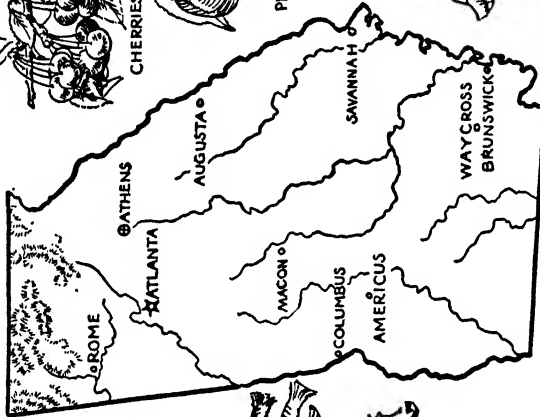
MARBLE WORKS



COTTON SEED OIL WORKS

GEORGIA

THE EMPIRE STATE OF THE SOUTH



CHERRIES



PLUMS



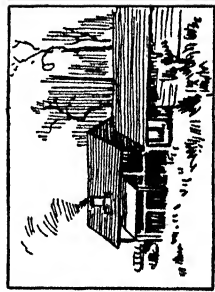
PEARS



SWINE



SHIPPING WATERMELONS



TURPENTINE DISTILLERY



IRON ORE MINING



RASPBERRIES



SWEET POTATOES



PICKING COTTON



CORN



PINE FORESTS

Items of Interest on Georgia

More than half the state, south of a line from Augusta, Milledgeville and Macon to Columbus, is included in the Coastal Plain; the uplands are subdivided into four parts, the largest and southernmost being the Piedmont Belt, then the Blue Ridge, the Great Valley Region, and in the extreme northwest the Cumberland Plateau.

Georgia has many rivers, including a few of considerable size; the Savannah drains most of the eastern section, the Altamaha the central part, and the Apalachicola the western part, other important streams are the Flint, Chattahoochee, Ogeechee and Satilla.

Georgia is noted for the variety of its soils. In the northern part sands and clays predominate, but in the extreme northwest, much of which is underlaid by limestone, the soil is loamy and very fertile; within the limits of the Coastal Plain the soils vary from sand to loam and heavy clay; the bottom lands along the rivers are generally rich in vegetable matter and are very fertile, the coast soils are often unsuited for cultivation on account of the swamps and marshes.

The mineral resources of Georgia are as varied as its climate and soils, thirty-nine different mineral products being found within its borders.

The most important mineral is stone; Georgia ranks usually sixth among the states as a producer of granite, and second of marble.

Limestone, cement, clay, and iron are mined in considerable quantities; the clay deposits are remarkable for their freedom from impurities.

Much of the asbestos found in the United States comes from the Sall Mountain mine in White county; Georgia produces more than all the other states combined.

Coal, coal tar, ammonium sulphate, illuminating gas, and some gold, silver and copper are also found in small quantities.

The state produces a large part of the manganese found in the United States.

The principal occupation in Georgia is agriculture, which uses seventy per cent of the area and sixty per cent of the wage-earners; with the exception of a few tropical fruits, almost everything cultivated elsewhere in the United States can be raised profitably.

The principal crop is cotton, to which about one-third of the total area under cultivation is devoted; Georgia ranks from fourth to sixth among the states as a producer of cotton.

The state is second in the production of sweet potatoes and third in peanuts.

It leads the United States in the raising of watermelons.

The tobacco crop, which is of very high grade, varies from 30,000,000 to 58,000,000 pounds a year.

The most important manufactured products are cotton goods, in which Georgia ranks fourth.

In the manufacture of cottonseed oil and cake Georgia takes high rank.

The state also ranks first in the value of fertilizers produced.

Questions on Georgia

How does the area of Georgia compare with that of other states east of the Mississippi?

Describe briefly the surface of the state.

What are the principal rivers?

In a general way show the relation between the surface conditions and the climate.

What are the leading mineral products?

How does Georgia rank as a producer of asbestos? Of marble?

What is the principal product of the fisheries?

How does Georgia rank as a producer of peanuts?

Name five other important crops.

Name five leading manufactured products and give Georgia's rank in each.

Why is Atlanta important?

Name five other large cities. Give the chief industries of each and any other reason why you think they are important.

of which are ochre, coal, iron, bauxite (the ore of aluminum), manganese, marble and granite, and throughout the state brick clay and pottery clay abound. The coal is of a semi-bituminous variety and is valuable for nearly all purposes, but the deposits are not large. The quarrying of marble has become an important industry. The Georgia marble is of excellent quality and strength and has acquired a wide reputation as a building and finishing stone. Iron ore and manganese are also quite extensively mined. Among other minerals found in small quantities are gold, silver and a few precious stones, including the amethyst and beryl; but the mining of these is a comparatively small industry.

Agriculture. Agriculture is the leading occupation, and a large proportion of the surface of the state is in farms. Cotton is the most important crop, though within recent years the various grains are being produced in increasing quantities. In the southern part of the state melons, peanuts, garden vegetables, oranges, pineapples, lemons and other semi-tropical fruits are raised in large quantities. Georgia is usually third among the states in raising peanuts, and first in yams and sweet potatoes. The uplands in the interior furnish an abundance of pasturage, and sheep, cattle and hogs are raised in large numbers. As in other Southern states, many of the farms are rented to negroes, by whom most of the work is performed with simple tools and implements. Extensive areas are covered with forests. In the north, these include the hard woods, such as oak, hickory and maple, while in the south the long-leaved pine is the prevailing timber tree.

Manufactures. Since 1900 Georgia has made rapid strides as a manufacturing state, and in this regard it now leads the South. The most important manufacturing industry is that of cotton goods. A large number of mills are in operation, and they have attained remarkable success. The production of hosiery and other knitted goods is also important. There are a number of mills for the manufacture of woolen fabrics. In the northwest are numerous iron works, and the manufacture of cotton gins and other machinery gives employment to a large number of people. The increased production in corn and wheat is also increasing the grist mill products from year to year. The production of lumber, turpentine and rosin is

very important, since Georgia is one of the leading pine-lumber states of the south.

Transportation. The large number of navigable rivers affords easy and cheap water transportation, but these are not as much used as formerly, because of the large number of trunk lines of railway now traversing the state in all directions. The important railway centers are Atlanta, Savannah, Augusta, Macon, Columbus, Athens and Waycross. By means of the numerous lines, which have a mileage of over 6,700 miles, all important towns have railway communication.

Government. The general assembly of Georgia in its 1931 session passed a reorganization act which became effective on January 1, 1932. Under the terms of this act the administrative boards, commissions, bureaus and departments of the state government were reduced from more than one hundred to seventeen, and economy and efficiency were effected. The legislative department, called the General Assembly, consists of a senate of fifty-one members and a house of representatives of 205 members, the membership of each house serving a two-year term. The senators are elected from senatorial districts into which the state is divided, and the representatives are chosen from the counties.

The general assembly holds biennial meetings and the law provides the machinery for a split session as follows: a ten day organization session in January and a sixty day legislative session beginning in July of odd years. However the general assembly is allowed to provide other arrangements as to the legislative session in its January meeting and can set any date prior to July. The governor, comptroller-general, attorney-general, secretary of state, treasurer and superintendent of schools are elected by the people. At present the governor holds office for two years and after he has served two consecutive terms he is ineligible for four years. However, a constitutional amendment providing for a four year term will be voted on by the electorate in the fall of 1936. The judicial power is vested in a supreme court, consisting of a chief justice and five associates chosen for six years by popular vote, a court of appeals similarly chosen and of the same membership and term of office, and superior courts in thirty-four judicial circuits. The judges of the latter courts are nominated by the voters

of the circuits which they serve and are elected by the state electorate for terms of four years.

History. The territory of Georgia was explored in 1540 by De Soto and in 1562 by Jean Ribaut. It was part of the original Carolina grant. In 1732 a company was organized by James Edward Oglethorpe to found a colony in America as a refuge for poor debtors and religious fugitives of Great Britain and Germany. Savannah was established in the following year. The colony was liberally governed under Oglethorpe but when he returned to England in 1743 it rapidly declined under his successors and trade in slaves and rum was introduced. The charter was surrendered in 1752, and Georgia was organized as a royal province. By the proclamation of 1763 the territory of Georgia was increased to include a strip of land extending to the Mississippi.

Georgia bore its part in the Revolutionary War, following the lead of other states, and suffered severely at the hands of the British and Tories. It ratified the Articles of Confederation in 1778 and was among the first to ratify the Federal Constitution (January 2, 1788). After the war there were Indian disturbances which eventually brought a collision with the United States government regarding the control of Indian lands. This was finally settled when the last of the Cherokees were removed from Georgia territory in 1838.

In spite of the strong hold of slavery upon the commercial interests of the state, there was a decided Union sentiment, led by Alexander Stephens, in opposition to secession but the state seceded in January, 1861. It was the scene of important military operations during the Civil War, including the march of General Sherman, and at the close of the struggle it suffered serious commercial depression. A bitter contest was waged in Georgia during reconstruction times, and twice the refusal of the legislature to conform to the requirements of Congress caused the state to be placed under military rule. It finally was readmitted July 15, 1870. During this time the carpet-bag government was in full force and the wealth of the state was wasted in wretched speculations and frauds. In recent years prosperity has returned, and Georgia seems to survive economic storms with slightly

greater success than the average state.

Related Articles. Consult the following titles for additional information:

Fall Line	Piedmont Region
Oglethorpe, James	Pine

GEORGIA, a republic in Transcaucasia, formed in 1928 by opponents (Mensheviks) of the new Bolshevik rule in Russia, fully organized in 1919, but won to Soviet rule in 1921. It joined the republics of Armenia and Azerbaijan in 1922 in the Transcaucasian Socialist Federal Soviet Republic, federated with Russian Communist rule. Tradition traces the ancestry of the Georgians back to Japhet, but their history first becomes trustworthy at the time of Alexander the Great, when they were freed from foreign rule and united into one kingdom under Pharnabazus, 324 B. C. Toward the end of the fourth century they became Christianized. For a time they were under the Arabs, but toward the end of the eleventh century regained their independence. From 1184 to 1212 they were in the height of their prosperity under Queen Tamara, who married a Russian prince. In 1799 George XIII resigned his throne in favor of the Russian emperor Paul, and in 1802 Emperor Alexander proclaimed the territory a Russian province; it remained so until 1918, poorly governed and subject to the czar's absolute rule.

GEORGIA, STRAIT OF, a large strait, 250 miles in length, between the American continent and Vancouver Island.

GEORGIA, UNIVERSITY OF, the oldest state university in the United States, chartered in 1785. According to the provisions of the charter, the primary and secondary schools of the state are officially connected with the university. The University System of Georgia (see EDUCATION, above) is controlled by a board of regents of eleven members, and the governor *ex officio*. The university proper is located at Athens; it includes the college of liberal arts, state college of agriculture and mechanic arts, Lumpkin law school, college of education, and the graduate school. It is coeducational, with a separate campus and classes for freshman and sophomore women known as the Coördinate College. The student enrollment for the regular sessions is about 2,600. The faculty numbers 165. There are 120,000 bound volumes in the library.

GEORGIAN, jawr'jan, BAY, a large bay in Ontario, constituting the northeast part of Lake Huron. It is partly separated from

the main body of the lake by the peninsula of Cabot's Head and the island of Great Manitoulin. It is about 120 miles long and fifty miles broad.

Georgian Bay Ship Canal, the name given to a proposed canal from Georgian Bay to Montreal, a distance of 440 miles. On 346 miles of the route advantage will be taken of lakes and rivers. From the Great Lakes to the sea the canal will effect a great saving in time, mileage and expense. A canal commission reported favorably in 1916, but work was delayed, and renewal of charter to build was refused by the Dominion, 1927.

GERANIUM, *je ra'ni um*, a large family of flowering plants, cultivated for their showy flowers and beautifully marked leaves. There are about 200 species of ornamental geranium, more properly called *pelargonium*. The blossoms grow in tight clusters on a sturdy stem, and range in color from white to deep red. The plant has a strong, short sappy trunk and branches of a similar structure. It is very hardy. The foliage of most species has a velvety texture and a spicy fragrance; the rose geranium leaf has a particularly delicious scent. A species of wild geranium called *crane's bill* is found in many parts of the United States, Canada and Great Britain. It grows thin and lank, has small clusters of magenta flowerets and long, beak-shaped fruit, from which it derives its name. Another wild species, known as *alfalaria*, grows in abundance on the Pacific coast, where it is a valuable forage plant.

GERARD, *je ra'rd'*, JAMES WATSON (1867-), an American diplomat who held the position of ambassador to Germany at the time the United States broke off diplomatic relations with the Imperial government. Gerard was born in Geneseo, N. Y., and was educated at Columbia University. Between 1908 and 1911 he was associate justice of the New York supreme court. He took a prominent part in Democratic politics in the state, and in 1914 was an unsuccessful candidate for United States Senator. President Wilson appointed him ambassador to Germany in 1913, and until 1917, when diplomatic relations were severed, he represented his country with courage and honesty in an exceedingly difficult post. On his return to the United States Gerard lectured on various phases of the war. He published *My Four Years in Germany* and *Face to Face with Kaiserism*.

GERMAN EAST AFRICA, the former name of Tanganyiki Territory, was Germany's most important colony until it was taken by the allied powers in the World War (1916). It lies in Africa on the east coast, and is bounded on the east by the Indian Ocean; on the south by Portuguese East Africa and Lake Nyassa; on the southwest by British Central Africa; on the west by Lake Tanganyika and Belgian Congo, and on the north by British East Africa. Its northern boundary crosses Lake Victoria Nyanza. The area is estimated at 384,180 square miles. The island of Mafia, off the coast, belongs to the colony.

The coast of German East Africa is low and flat, but there are high plateaus in the interior, from which rise lofty mountain groups, among them Kilimanjaro, a volcanic peak 19,720 feet high and the highest point in Africa. The country is watered by the rivers Ruaha, Mzombe, Mgeta and Rufigi and their tributaries, none of which are navigable. There are some unimportant streams in the interior, which drain into lakes Tanganyika and Victoria Nyanza and thence into the Congo and the Nile. The chief industries are agriculture and cattle-raising. Millet, wheat, cotton, sesame, tobacco, copra and rice are grown, and bananas are cultivated along the coast. The chief exports are ivory, rubber, cereals and coffee. Coal, iron, salt and a little gold have been found.

In 1916 the British army in Africa started a strong campaign to wrest the colony from the Germans, whom they had already deprived of German Southwest Africa. One of the policies of the entente allies in the World War (which see) was to capture all German Colonies. British forces succeeded in taking the colony, and the peace conference gave Great Britain the mandate to govern the country, now called Tanganyika Territory. Two populous sections were placed under Belgian administration. Population, estimated, 4,000,000, of which about 2,500 are white. (See Tanganyika.)

GERMAN LANGUAGE, the language spoken by the majority of the inhabitants of Germany, and by several million others in various parts of the world.

The history of the language is divided into three parts—Old High German, to 1100; Middle High German, from 1100 to about 1500; New High German, from about 1500 to the present time. The limits are approx-

imately the same as those assigned to the three periods of the English language. The word "High" in each case has a purely geographical significance. In the earlier periods of the language, the dialects of South Germany, as the section was best known before the World War, are designated as High German, from the more mountainous character of those districts, while the language of North Germany was called Low German. The Low German dialects, as well as the High, were spoken in the periods referred to, but as the works of literature preserved belong chiefly to the latter dialects, the whole period is so characterized. By examination of dialectical peculiarities, scholars are able to locate specimens of literature from those periods with considerable exactness. In the same way today a German peasant's native province can be approximately determined. These peculiarities, which the printing press and a uniform educational system have obliterated in a great measure in the spoken language, especially in the last generation, still survive in the more isolated districts, and it is quite possible to find two peasants from different parts of Germany who cannot make themselves understood by each other. In modern printed German there are no considerable variations, but in speech even the educated will usually betray their dialect in some peculiarity of pronunciation or vocabulary.

The most powerful agency in fixing a common written language for Germany was Luther's translation of the Bible (1534), and this is conveniently made the beginning of the New High German period. The fact that this work had a wide circulation made it, dialect, which was intermediate in character and geographical position, familiar throughout Germany, and subsequent writers who wished to reach a large circle of readers naturally employed it. The first German grammar appeared in 1540, and subsequent grammars and dictionaries gradually fixed the forms of the language.

GERMAN LITERATURE. See **LITERATURE**, subhead *German Literature*.

GERMAN MEASLES. See **MEASLES**.

GERMAN SILVER, or **NICKEL SILVER**, is an alloy of copper, nickel and zinc in varying proportions. Spoons and forks are made from two parts copper, one nickel, one zinc; knife and fork handles from five parts copper, two nickel, two zinc, a mixture closely resembling alloyed silver (addi-

tion of lead produces an alloy well fitted for casts and candlesticks). Iron or steel makes the alloy whiter, harder and more brittle. German silver is harder than silver and takes a high polish. It is affected by some acids, notably vinegar and by some salt solutions.

GERMAN SOUTHWEST AFRICA, now called Southwest Africa, a former German possession on the western coast of Africa, 322,000 square miles in area, extending for a distance of 900 miles, from the Orange River to the Cunene River, excepting Walfish Bay. The territory became German through establishment of trading stations as early as 1883. The north part is called Damaraland, and the southern, Great Namaqualand. The region is mostly a plateau, with mountains rising in the Onataka to a height of 8,800 feet. The chief industry is cattle-raising. In the western part are fine pastures and much fertile land. Little has yet been done to develop the deposits of gold, copper and lead. The exports are ostrich feathers, hides, horns, ivory and wool. The harbors are poor, and most of the commerce passes through Walfish Bay. In 1915, in the second year of the World War, British South African troops captured the small German force defending the colony and formally took possession of the region. After the war the Germans confidently expected the return of this colony and German East Africa to them, but the victorious entente nations rejected Germany's claim. The peace conference gave its mandate to govern the country to the Union of South Africa, to be responsible for the same to the league of nations. Population, 200,000.

GERMANTOWN, BATTLE OF, an important battle of the Revolutionary War, fought October 4, 1777. A British force under General Howe was in possession of Germantown, a suburb of Philadelphia. The Americans under General Washington attacked this position in two columns and were at first successful, but a fog arose and two American forces approached one point from opposite directions and fired into each other's columns, immediately creating a panic among the Americans and causing defeat when victory was practically assured. The daring and skill of Washington's plan deeply impressed European military critics and was one of the causes which led to the French alliance.

Germantown, formerly a separate suburb of the city of Philadelphia, is now within the

city limits. It is noted for the beauty of its surroundings and for its parks. It was settled in 1683 by Palatinate Germans. The first paper mill in America was established there in 1690, and the first American edition of the Bible was published in Germantown in 1743.

GERMAN UNIVERSITIES. See UNIVERSITY, subhead *German Universities*.



A castle on the Rhine

GERMANY, a country in the central part of Europe, created an empire of twenty-six states in 1871, at the close of a brief but victorious war with France, through the genius of Bismarck. Forty-three years later the two nations again were at war, this time engaged in a terrible struggle that finally involved three-fourths of the world. It was the fate of Germany, after a period of amazing prosperity and development, to be confronted by the strongest coalition in history. Two weak European states and the decadent Turkish Empire were its sole allies; ranged against this alliance were all the first-class powers of the continent of Europe, the British Empire and the American republic, besides a number of small nations in different parts of the world. Late in 1918 the military leaders of Germany announced that they could no longer carry on the struggle, and that the government must ask for an armistice. The long-suffering German people, who had been buoyed up by promise of certain victory, turned against their rulers and formed a republic, while their once popular emperor, William II, fled to Holland to assure his personal safety. The events that followed are summarized in the subhead **HISTORY**, on pages 1502-1503.

Location and Area. Germany as it existed at the outbreak of the World War had the following boundaries: on the north were the North Sea, Danish Jutland and the Baltic; on the east, Russia and Austria-Hungary; on the west, France, Belgium and the Netherlands; on the south, Austria-Hungary and Switzerland. These boundaries were changed in certain respects after the treaty of peace was signed, as Austria-Hungary

was broken up at the close of the war, and Germany also suffered losses of territory.

Imperial Germany had an area of 208,780 square miles; that is, the country which fought against three-fourths of the world was 57,000 square miles less in area than Texas, the largest American state. The new Germany was deprived of Alsace-Lorraine, which reverted to France by terms of the peace treaty; it lost territory to Poland; suffered the loss of Danzig and a corridor leading from that city to Poland; had to cede 382 square miles to Belgium, and for a period of fifteen years, at least, lost the rich Saar coal region. Besides, there was ordered a vote in Schleswig peninsula, which carried half of that area into union with Denmark. These were continental losses only, and totalled 26,567 square miles. All of Germany's colonial possessions, 1,140,115 square miles, were taken away, possibly without hope of recovery. The area of Germany proper was reduced to 182,213 square miles.

The People. Under the Empire the population exceeded 65,000,000; soon after the war it was estimated at 60,000,000. The national census of June, 1933, reported a total of 65,913,082. About 4,000,000 are of non-German blood—Poles, Danes, Czechs, and Jews; of the latter there were 600,000 in 1932. Before the war there were 23 cities with populations exceeding 300,000; in 1933 there were 22. Berlin, the former imperial capital, and now the capital of the republic, is the largest city on the Continent; it has forged ahead of Paris.

Following Berlin (4,190,847) and Hamburg (1,125,025), the next largest cities in the country are Cologne (750,190), Munich (734,785), Leipzig (712,475), Essen (654,538), Dresden (649,248), Breslau (625,219), Frankfurt-on-Main (555,071) and Dortmund (540,480). There are six cities with populations between 400,000 and 500,000, six between 300,000 and 400,000, five others exceeding 200,000, and 24 between 100,000 and 200,000, in a country now two-thirds the size of Texas. During the war, munition centers increased their size amazingly; for example, Bochum had 765,000 people in 1918, but is now normal, with 314,000.

The Germans belong to the Teutonic division of the human family, and in their own tongue are known as *Deutsch*. In some respects they are among the strongest of all nationalities, and they have very definite

characteristics. Visitors who go to Germany from other countries are wont to marvel at the precision and systematic orderliness manifest everywhere—in the arrangement of orchards and fields, in the laying out of streets, in the construction of public works, and so on. This precision is typical of a people who are more thorough and persistent than they are creative; more apt at developing and perfecting new ideas than they are in originating them. In all lines of intelligent activity, however, they have made important contributions to the world's progress—in education, philosophy, science and literature—while in music they have a place held by no other people.

It has been generally accepted that the ardor with which the German people entered the World War and the ruthlessness with which they carried on the struggle were the result of a faulty education which made them a militarist nation. They were taught that it was Germany's destiny to dominate the world, that other nations were backward or degenerate, and at first the war had a religious significance for them. The doctrine of the superiority of the state and the inferiority of the individual had a firm place in German thought, and the people as a whole accepted the theory with docility. The revolution of 1918 and the subsequent events show that the war broke down many false ideas.

Language. See GERMAN LANGUAGE.

Literature and Art. See LITERATURE, subhead *German Literature*; PAINTING; SCULPTURE.

Education. In Germany all grades of education are under the control of the government, the minister of public instruction being at the head of the educational system. Three classes of schools are maintained: The primary, or folk, school, in which attendance between seven and fourteen years is compulsory; the secondary schools, represented by the *gymnasias* and *realschulen*, and the higher institutions, including technical schools and universities. Children who desire may be transferred from the folk schools to higher schools as soon as the rudiments are learned. This is usually the custom of those who plan to have more than an elementary education. Some of those who pursue the eight-year course of the folk school go later to trade schools. Primary schools are established in all villages and rural communi-

ties and are supported by government and local taxation. All teachers are licensed by the government and are required to be graduates of normal schools. Teaching, even in the elementary schools, in Germany is a profession, and one enters upon it with the intention of making it his life work. After serving the required time, the German teacher is retired on a pension.

The gymnasias are secondary schools which give special attention to the ancient classics and fit their students for the classical departments of the universities, while the *realschulen* give attention to modern languages and sciences. Technical schools are numerous and provide for instruction in all lines of skilled labor, as well as in the branches of civil and electrical engineering. There is practically no illiteracy in Germany. For a description of German universities, see UNIVERSITY.

Religion. About sixty-four per cent of the inhabitants are Protestant, and thirty-two per cent are of the Roman Catholic faith. Freedom of worship was endangered by Dictator Adolf Hitler, who sought to put down all influences unfavorable to his regime.

Surface and Drainage. Germany is naturally divided into three surface regions, the Alpine foreland, the central highlands and the great plain. The first occupies the extreme southeastern portion of the country and contains a part of the Alps. There are found the highest elevations and the most rugged mountain scenery. To the north and west of this and separated from it by the basin of the Upper Danube is the central highland region, extending westward from the Carpathian Mountains to the Rhine and northward to within about 100 miles of the North Sea. The highland region is traversed by numerous ranges of low mountains, among the most important being the Harz, the Riesengebirge, or Giant Mountains, the Vosges and the Erzgebirge, or Ore Mountains. All of these are low mountains with rounded summits which have been denuded of most of their soil. The valleys are comparatively shallow, having been filled with the débris carried from the mountains by ice. This portion of Germany presents a diversified appearance of low mountains and broad valleys, and it is covered with a fine growth of vegetation and watered by numerous streams. To the north of the central highlands and occupying fully one-third of the country is

the great plain, which extends from the eastern boundary to the North Sea. This is a portion of the great Asiatic plain, which covers a large part of eastern and northern Europe. This plain is not perfectly level; its highest portions are about 600 feet above sea level, and it has a gradual slope towards the north.

The rivers of Germany are divided by the central highland region into two systems, those flowing into the Black Sea and those flowing into the North and Baltic seas. Of the first system the Danube is by far the most important, and it drains only the southeastern portion. The other system includes all of the other important rivers and drains most of the country. Going from the west eastward, these rivers, in order, are the Rhine, the Ems, the Weser and the Elbe, flowing into the North Sea; and the Oder and the Vistula, flowing into the Baltic. Of these the Rhine is the most important. It has its source in Switzerland and flows entirely across Germany, as does the Elbe, which drains a good portion of Bohemia. The Weser and the Oder are limited to German territory, while the Vistula drains a large portion of Russia and simply finds an outlet through Germany. All of the important streams flowing into the Baltic empty into shallow lagoons, called *haffs*. Between the Oder and the Vistula are a number of less important streams, and the Memel drains the extreme northeastern section.

The mountainous region in the south and southeast contains numerous lakes, which in the clearness of their water and the picturesque of their surroundings resemble the lakes of Switzerland. In the lowlands in the northern and northeastern portions there are also numerous shallow lakes. These have low shores, which rise gradually to the level of the surrounding country.

Climate. Germany has a mild, temperate climate. The variation in temperature is more marked from west to east than from north to south. In general the temperature becomes lower as we pass from the southwest to the northeast, the altitude of the highland region offsetting in temperature whatever advantage might otherwise be gained by latitude. The western portion has a higher annual temperature than the eastern, because of the influence of the warm winds which blow from the Atlantic during a good portion of the year. The mean temperature for Southern Germany in July is

a little above 70°, while that for Northern Germany is a little below 70°. The winter contrast between the western and eastern portions is noticeable in the condition of the rivers flowing into the North Sea and those flowing into the Baltic. The former are scarcely ever frozen, while the latter may be obstructed by ice for several weeks or even months. Because of the cold water in the Baltic, the spring in the northeastern portion is cold and late.

The rainfall varies considerably in different localities, being heaviest in the mountain regions and along the western coast. In some sections it averages forty inches per year, while in most regions the average is about twenty inches, and in a few localities it is less than this. The general average is about twenty-eight inches.

Mineral Resources. Germany is the leading country of the continent in the production of coal, and among all nations is exceeded only by the United States and Great Britain. Coal and iron give great impetus to manufacturing. The iron output is less than before the World War, for to Poland was given German territory in which its richest iron mines were located; it has fallen about two-thirds in volume from pre-war levels, to about 6,000,000 tons annually, and the steel industry has declined proportionately. Other minerals of importance are silver, of which Germany produces about one-half of the entire output of Europe; copper, zinc, lead and nickel. Among the valuable stones are building stones of different kinds and lithograph stone. Salt is found in large quantities in some localities, as are compounds of potash, which are of great value in the manufacture of glass and other commodities. Amber of superior quality is obtained along the Baltic.

Agriculture. About one-half of the land is devoted to agriculture, a little more than one-fourth of it is under forests and about one-tenth is either unproductive or is covered by buildings. Agriculture is not the leading occupation, but it engages nearly one-third of the population. There is a greater variation in the size of farms than is found in France and Belgium, but the number of small farms is very large. Many of the smallest farms are cultivated by those who devote a portion of their time to other occupations. The soil and climate are in general well adapted to agriculture, except

in the northern and northeastern portions, and even here the scientific methods of fertilizing and tilling the soil enable the farmer to reap good returns for his labor.

The products vary widely, because of difference in soil and climate. In the southern portion corn, hops and fruits are the most important products, except on the higher elevations, where rye, oats and potatoes are extensively grown. The northern portion is largely devoted to the growing of grains, among which rye takes the leading place, followed by oats. Here, also, as well as in the central portion, extensive areas are devoted to the raising of sugar beets and potatoes. Considerable barley and wheat are grown in these regions. The valleys of the Rhine, Moselle and a few other rivers are devoted almost entirely to the culture of the grape and the production of wine, and Rhine wines, because of their excellence, have become known throughout the world. In general, the most improved tools and agricultural implements are used, and the latest and most effective methods are employed by the German farmers, all of whom have received more or less technical education, which they add to their practical experience in managing their farms. A very large proportion of the farms are tilled by the owners.

Manufactures. Normally Germany is one of the leading manufacturing countries of the world, being foremost upon the continent of Europe and exceeded only by the United States and the United Kingdom. The manufacturing industries include a great variety and are very generally distributed. In normal times the most important line is the manufacture of textiles, including cotton, woolen and silk goods; during the World War metal products directly connected with the conduct of the war naturally had first place, but the iron and steel manufactures are always of very great importance. In the production of some iron and steel goods Germany leads the world, particularly in the manufacture of hardware, including cutlery and tools, certain forms of heavy machinery and other articles, such as marine engines, heavy artillery and armor plate for battle-ships. The manufacture of chemicals, scientific instruments and small wares is also important, and in each of these lines the Germans exhibit great skill. Their scientific instruments are considered the most accurate

in the world. Other important industries include brewing, dyeing, wood carving, type founding and the manufacture of jewelry, gold and silver ware, printers' supplies and toys. Because of the scarcity of many kinds of raw material and the demands of the war industries, German ingenuity applied itself to the manufacture of various substitutes during the war. Paper was used, for example, to make clothing and string, and many ingenious food substitutes were placed on the market.

Transportation. The Rhine, the Weser, the Oder, the Elbe and the Vistula are all navigable for long distances. Many of the other streams have been canalized, and all important navigable rivers are connected by canals, so that the country has a complete and convenient system of waterways, while the construction of the Kiel Canal across the peninsula of Jutland has afforded a short outlet from the Baltic to the Atlantic. The railway system is one of the most complete in the world and comprises about 36,280 miles. Berlin is the great railway center, and lines radiate from the city in every direction. It is also the greatest airport on the Continent, if not in all Europe. Airlines operate on fast schedules to every capital city of Europe, and reach some Asiatic points.

Commerce. Germany has long been one of the greatest commercial nations. The excellence of its manufactured products and the systematic method of introducing these to the various countries enabled it to develop an extensive foreign trade. The leading exports consist of manufactured goods, particularly textiles, iron and steel products, chemicals, dyes, malt liquors, scientific instruments, small wares, jewelry and gold and silver ware, while the chief imports consist of food stuffs and raw material for the manufactures. The old peace-time foreign commerce, amounting to about \$5,000,000,000 a year, was destroyed during the great war, but with lessening of rancor it grew again practically to pre-war levels by 1927. The Hitler government incurred world enmity in 1934 by its internal policies, particularly respecting its treatment of the Jews, and foreign trade fell to less than half of its former total. Germany's commercial situation was for a time alarming to its friends.

Colonies. Before the World War Germany possessed a colonial empire in Africa,

Asia and the Pacific, covering 1,140,115 square miles, as follows:

COLONIES	AREA
Togoland.....	33,668
Kamerun.....	305,019
German Southwest Africa.....	322,432
German East Africa.....	384,170
New Guinea.....	92,664
Caroline Islands.....	956
Samoa.....	993
Kiao-chau.....	213
Total.....	1,140,115

By terms of the peace treaty none of this territory was left to Germany. (See the articles on these titles.)

Government. On February 6, 1919, the National Assembly of the German republic, elected by universal suffrage, met in Weimar under the leadership of Chancellor Ebert, who was subsequently elected Provisional President of the German state. A new constitution was proposed, containing, among other provisions, the following:

The national territory shall consist of the former German states as well as other states that may, after a plebiscite, desire to be incorporated with Germany. The flag of our new republic will be black, red and gold.

The generally accepted rules of international law shall be a basic part of the German law.

The national law shall supersede the state laws of the various German states, which are empowered to combine wholly or in part for the purpose of creating a more powerful membership in the nation. These states will be represented in the government by a National Council. Each member of the Council can introduce bills, but a bill to be introduced to the Assembly must have the assent of the Council.

Full freedom in religion, art and science is guaranteed.

Labor, as the greatest national wealth, is especially protected. Personal freedom of dwelling and property are guaranteed, as is secrecy of the postal service.

Details shall be determined by the national government regarding the regulation of the elections. The government will meet each year on the first Monday of December at the capital of the government.

The President can call the Assembly earlier and must do so if at least one-third of the members demand it be called. A court to control the voting would consist of three members of the Assembly and two members of the National Council. The constitution may be changed by a two-thirds vote of the full membership of the Assembly.

President must be at least thirty-five years old and a German citizen for ten years and will serve a seven-year term. He may be

recalled through a popular vote. The President cannot be a member of the Assembly. The Assembly can demand the presence before it, of the Chancellor and the Cabinet. The head of the Cabinet, which has fourteen members, is the chancellor.

Thus a republican government succeeded to the imperial power of the Hohenzollern monarchy. The old states of the Empire preserved their identity under the republic, and shared in the law-making power in the National Assembly. The government weathered opposition storms for more than a decade, when the rise of the National Socialists, under Adolph Hitler, altered the pattern of the state. The sole governing power was lodged in the chancellor (Hitler) and his Cabinet, in March, 1933; the Cabinet was empowered to make laws by ordinance and proclamation. One of the early acts of Chancellor Hitler, was to abolish all state lines, "making Germany one single state in fact, as it was at heart." In a brief time the country realized that it was in the hands of a dictator. The Reichstag was completely dominated by Der Fuehrer (Hitler), and was certain to endorse by legislation every decree for which he asked. Thus Germany (1934) was within the sole power of one man.

History. Early Period. Although mention is made as early as the time of Alexander the Great of German tribes on the Baltic coast, the first important occurrence in connection with them of which we have any authentic record was their defeat of the Roman consul Papirius, in 113 B. C. In 102 B. C. the Teutones were defeated by the Roman general Marius. Julius Caesar, in his *Commentaries*, gives an account of certain Germanic tribes whom he found between the Rhine and the Vosges, and he came into conflict in Gaul with a German king, Ariovistus. The name Germani was not used by the Germans in reference to themselves, but was probably formed by the Romans from a Gallic word. At various times in Roman history the Romans were concerned with different German tribes, and by the beginning of the Christian Era Roman dominion had been firmly established in Germany. When an attempt was made in A. D. 9 to force Roman customs upon the German peoples, they rebelled under the leadership of Arminius and completely defeated the Romans.

The Romans never again established themselves in Germany, and in the early centuries

of the Christian Era they were often forced to defend themselves against the invasions of powerful German tribes, chief among whom were the Alemanni, the Franks, the Vandals, the Suevi, the Goths and the Lombards. Tacitus, in his *Germania*, gives a valuable and interesting account of the customs and lives of the early Germans. By 486 the ambitious Frankish chief Clovis had defeated the Romans in Gaul, and had set up his court on the future site of Paris.

Medieval Period. From the time of Clovis to the Treaty of Verdun in 843, the history of Germany is identical with that of France (see FRANCE, subhead *History*). By the Treaty of Verdun, Louis, the son of Louis the Pious, Charlemagne's son, received that division of Charlemagne's great empire which corresponded to modern Germany, and at that time the history of Germany as a separate country began. Louis reigned until 876 and made some advancement toward national unity. The son of Louis, Charles the Fat, succeeded for a time in reuniting the three kingdoms—France, Italy and Germany—but as he was unable to defend his empire against the Northmen, the nobles deposed him and elected his nephew, Arnulf, in his stead (887).

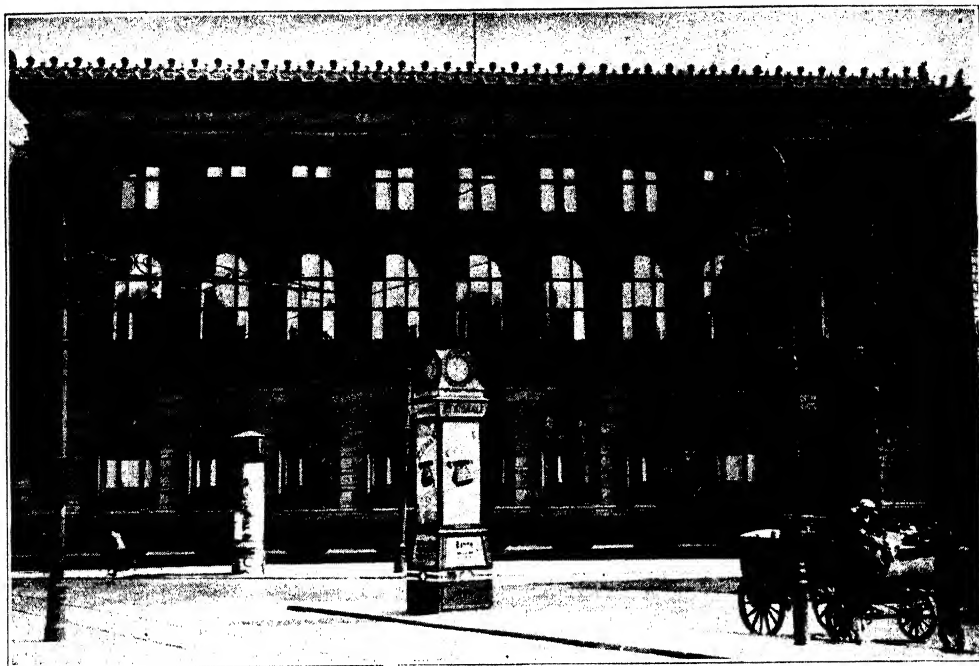
On the death of Louis the Child, the last of the Carolingian dynasty, Conrad of Franconia was elected king. His reign was occupied with futile attempts to protect Germany against the invading Hungarians, and also with his quarrels with his powerful nobles. The most powerful of these, Henry of Saxony, succeeded Conrad in 919 as Henry I (the Fowler), first of the Saxon line. He is considered the creator of the German Empire. He united the dukedoms under his rule, built fortresses, reformed the military system and defeated the Wends and Hungarians. Otho I, son of Henry, came to the throne on his father's death in 936, and under him the royal power was greatly increased. He restricted the power of the nobles, defeated the Hungarians on the Lech in 955, acquired the crown of the Lombards in 961, and in the following year assumed the imperial title, thus founding the Holy Roman Empire, which existed until 1806.

Otho reigned until 973 and was succeeded by his son, Otho II (973-983), a well-meaning but somewhat weak monarch. Under Otho III, a young and enthusiastic king who was desirous of setting up a world empire with

Rome as its capital, Germany was greatly neglected for Italy, and thus a condition of anarchy grew up. Henry II (1002-1024), the last king of the Saxon house, devoted more of his attention to his German than to his Italian possessions, and matters mended somewhat in Germany.

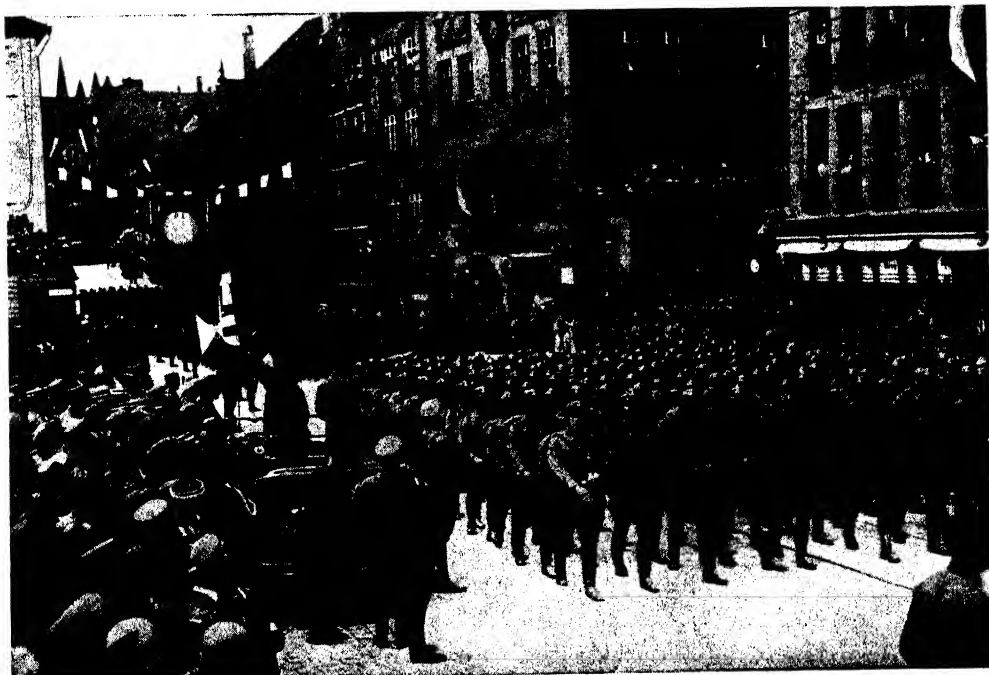
The first of the Franconian kings, Conrad II (1024-1039), was an energetic monarch who subdued the nobles and recovered the lands of the crown, and his work was carried on ably by his son, Henry III (1039-1056). During the reign of Henry III the right of the Pope to interfere constantly in the affairs of the empire was seriously questioned, and had Henry lived longer he might have put an end to this interference. His son, Henry IV, was an able king, but his constant troubles with the Pope allowed his great nobles to increase greatly their own powers. The decline of the royal power continued under Henry V (1106-1125) and Lothair (1125-1137), so that the title of emperor became almost an empty honor.

The period of the Hohenstaufen emperors, which began in 1138, is the most famous in medieval German history. It is marked by a bitter conflict between the imperial and the papal powers and by the beginning of the Crusades. Conrad III (1138-1152), the first of the Hohenstaufen emperors, took part in the Second Crusade, and Frederick Barbarossa, one of the ablest of the Hohenstaufen emperors, was drowned during the Third Crusade. Frederick's son, Henry VI (1190-1197), by marriage inherited the kingdom of Naples and Sicily, which remained in the possession of the Hohenstaufens until 1265. The possession of this territory by the emperors was a great injury to Germany, because it led them to neglect their German subjects. Henry VI attempted to make the imperial crown hereditary. The remaining kings of this line were Philip of Suabia (1198-1208), Frederick II (1215-1250) and Conrad IV (1250-1254). The period is filled with contentions with the Popes and the Italian cities and with constant internal strife. The royal power became insignificant, and neither German king nor Roman emperor in reality existed. Some of the rulers seemed little concerned about Germany, dividing their time between Sicily and the Crusades, and Frederick II, one of the ablest of medieval rulers, was not in Germany for fifteen consecutive years.



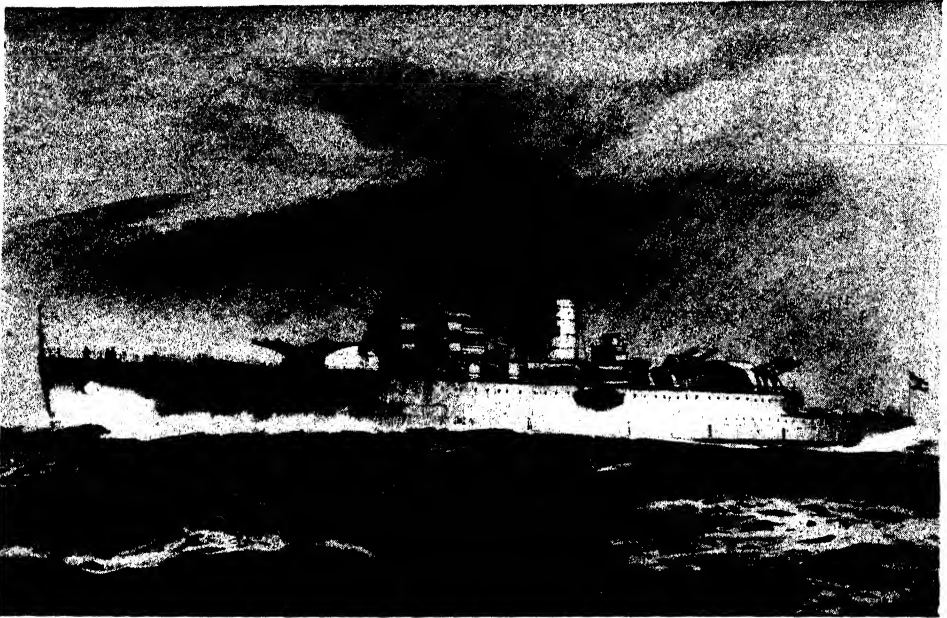
Wide World

THE REICHSBANK, BERLIN, GERMANY
Fiscal agency of the German Reich.

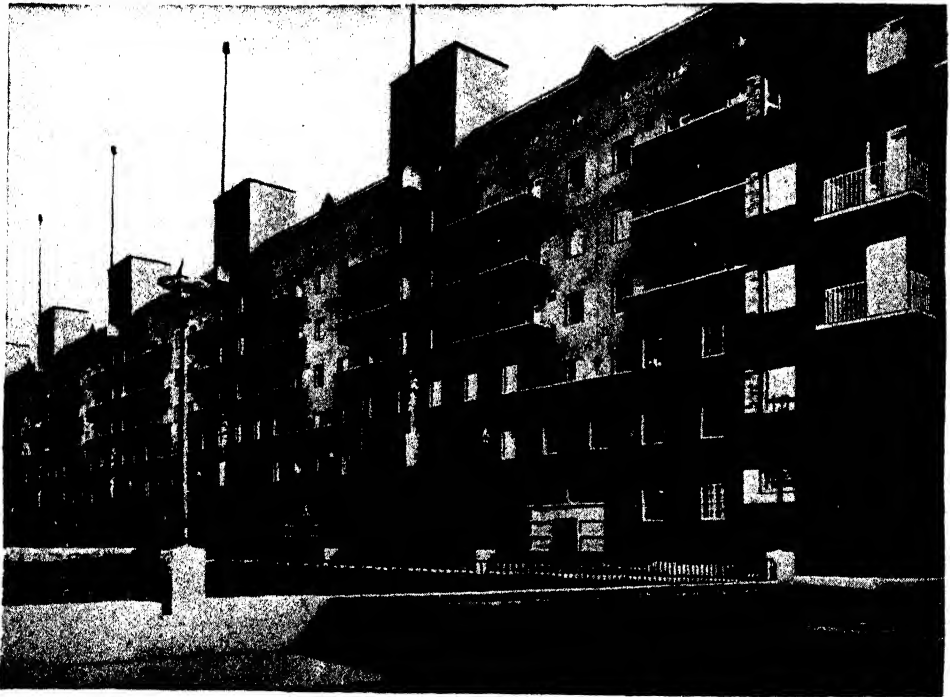


Acme

HITLER REVIEWS PARADE IN MUNICH
Celebrating the tenth anniversary of his first attempt to break the republican régime.



Pacific & Atlantic



Underwood & Underwood

GERMANY

Above: The German cruiser, Ersatz Preussen, 10,000 tons, launched in 1929; a "vest-pocket" battleship.

Below: Apartment house in Berlin, of modernistic design.

The period between the death of Conrad IV in 1254 and the election of Rudolph of Hapsburg in 1273 is known as the Great Interregnum. The right to choose the emperor had been gradually usurped by a few of the powerful nobles, who were called electors, and on the extinction of the Hohenstaufen line these electors practically offered the crown for sale. Various bidders appeared, and the two offering the largest bribes, Richard of Cornwall and Alphonso of Castile, were elected, but neither of them was crowned emperor at Rome nor acquired any real power. Finally, in 1272, the Pope ordered a new election, and in the following year Rudolph I (1273-1291), of the House of Hapsburg, was raised to the throne. He in a measure restored order and strengthened the royal authority. Through his defeat of Ottokar II of Bohemia he acquired lands in Southeastern Germany, the most important being Austria. This his son Albert received with the title of duke, and from this dates the rise of Austria and the House of Hapsburg (see AUSTRIA-HUNGARY, subhead *History*).

During the fourteenth and part of the fifteenth centuries there was but little of interest in the history of Germany. The imperial crown was passed around from one house to another and was openly offered to the highest bidder, the only care of the electors being to choose a prince not strong enough to endanger their authority. At one time there were three rival emperors ruling simultaneously. The first noteworthy event, besides the revolt of the Swiss, was the promulgation in 1356 by Charles IV (1348-1378) of the Golden Bull, which secured to four secular and three ecclesiastical princes the right of election and defined their power. This decree was in force till 1806. Another noteworthy event was the war of the Hussites.

Early Modern Period. In 1438 Albert II of Austria was elected emperor, and from this time until the dissolution of the Holy Roman Empire in 1806 the crown was regarded as hereditary in the Hapsburg family, although the electors always made a formal choice. The greatest of the early Hapsburg emperors was Maximilian I (1493-1519). His reign marks a strong tendency toward centralization and the material growth of the imperial authority. He was succeeded by his grandson, Charles V (1519-1556). Charles

bestowed the Austrian possessions of the House of Hapsburg on his brother Ferdinand, who may be said to have founded the monarchy of Austria-Hungary. The Peace of Augsburg (1555), with which the struggle between the Catholics and Protestants for the time terminated, granted to the Lutheran states the right to establish the Protestant worship. Three provisions of the Peace of Augsburg were later the cause of much trouble. These were the provision that each prince could choose his state religion and banish all subjects not conforming to it; that any ecclesiastical prince on becoming a Protestant was required to give up office and lands, and that all lands not secularized in 1552 should forever belong to the Catholics.

During the reign of Charles's successor, Ferdinand (1556-1564), a counter reformation was begun by the Roman Catholics, and this movement spread rapidly and was continued during the reigns of Maximilian II (1564-1576) and Rudolph II (1576-1612). While Matthias (1612-1619) was on the throne, his cousin Ferdinand was crowned king of Bohemia (1617), and the attempt to force the Protestants of that country to accept him as their ruler led to the outbreak of the Thirty Years' War (1618-1648). The struggle closed in the reign of Ferdinand III, by the Peace of Westphalia. Germany by this treaty was divided into over 200 independent states, which owed only a nominal support to the emperor and became in fact simply petty monarchies. The imperial authority was completely wrecked and never afterward recovered. The war had devastated and impoverished Germany beyond measure, national feeling had been crushed out and all unity had been destroyed. Most of the rulers of the states were despots, who desired only to pattern themselves after Louis XIV, the absolute monarch of France. The War of the Palatinate (1689-1697), undertaken by Louis XIV, increased the desolation of the country.

Rise of Prussia. The interest of German history after the Treaty of Westphalia centers largely in the rise of Prussia (see PRUSSIA, subhead *History*). The Great Elector, Frederick William (1640-1688) gained increased territory for his state, and by strengthening the royal authority and forming a standing army brought Prussia rapidly forward. His son Frederick III (1688-1713), added to his title of elector of Brandenburg

that of king of Prussia (1701). Nominally, the king of Prussia was still subject to the emperor, but from this time on, the emperors were in fact merely rulers of Austria, and the imperial dignity was but an empty honor. With the death of Charles VI (1711-1740), the male Hapsburg line became extinct. The attempt of Charles to secure by the Pragmatic Sanction his dominions to his daughter Maria Theresa, brought on the War of the Austrian Succession.

After a two years' interregnum, the electors chose Charles VII of Bavaria as emperor (1742-1745), and on his death Maria Theresa's husband, Francis I (1745-1765), was elected. His successor, Joseph II (1765-1790), tried to establish the imperial authority in Southern Germany, but was prevented by Prussia. In 1756 war broke out between Maria Theresa and Frederick the Great of Prussia (1740-1786). The advantage was decidedly with Frederick, and under this great ruler, whose statesmanship was as remarkable as his generalship, Prussia became the equal of Austria and showed itself as the one possible center for a united Germany. The French Revolution destroyed the remnant of the empire, and after the formation by a number of German states in 1806 of the Confederation of the Rhine, under the protectorate of Napoleon, Francis II formally resigned the imperial crown and the Holy Roman Empire ceased to exist.

Napoleon's plan to add Germany, or at least the states of the Confederation, to his empire, was frustrated, and at the Congress of Vienna, which met to restore order out of the chaos into which European affairs had been plunged, the German states were organized as a confederation, with the emperor of Austria as president (1815). The various German states were independent in internal affairs, and interstate disputes were to be settled by a diet. Each state was to have a constitutional form of government, but this provision was little observed until the revolutions of 1830 and 1848 forced the German rulers to accede to the demands of their subjects. In 1830 was formed the Zollverein, which secured free trade among the several states. In 1848 a national assembly met at Berlin for the purpose of framing a national constitution, but the rivalry of Austria and Prussia prevented any successful results, and the Prussian king, Frederick William IV, refused the title of emperor of the Germans.

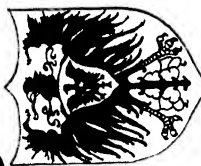
Frederick William IV was succeeded in 1861 by William I (1861-1888), who soon called into his Ministry Bismarck. His policy of "blood and iron" made possible the final firm union of the German nation. The rivalry between Prussia and Austria was encouraged by Bismarck, who was making ready for the struggle which he knew would come. The final cause of the outbreak was the contention over Schleswig-Holstein, which had been taken from Christian IX of Denmark (see DENMARK, subhead *History*). War began between Austria and Prussia in 1866. The outcome was complete success for Prussia, and in 1867 the North German Confederation was formed, with the king of Prussia as president. The Catholic states of the south, Bavaria, Baden and Württemberg, held aloof. Just before the close of the Franco-German War, they joined the Confederation.

The Empire. By the treaty which followed the Prussian victories, France lost Alsace and Lorraine and was compelled to pay a large indemnity. The most important result to Germany, however, was the enthusiasm and the spirit of nationality awakened by the Prussian success. The German Confederation was changed to the German Empire, and William I, king of Prussia, was proclaimed German emperor on January 18, 1871. The title was to be hereditary in his family, and it descended at his death to his son, Frederick III. Frederick III lived but a few months after his accession and was succeeded by his son, William II. William at once showed his intention to keep personal control of the government and accordingly in 1890 dismissed Bismarck, who did not approve of his policy.

About 1883 Bismarck aided in the formation of the Triple Alliance, which included Germany, Austria-Hungary and Italy, and this was renewed in 1891 by Caprivi, the successor of Bismarck. Caprivi was succeeded in 1894 by Hohenlohe, during whose chancellorship rapid progress was made in the extension of German dominion in Africa. The murder in 1898 of two German missionaries in China gave Germany a pretext for demanding the cession of the port of Kiaochau in Shantung, China, and the murder of the German Ambassador in Peking in 1900 compelled Germany to take a prominent part in the expedition of the European powers against China. Under Count von Bulow and Theobald von Bethmann-Hollweg, the suc-

GERMANY

From
1814



To
1918

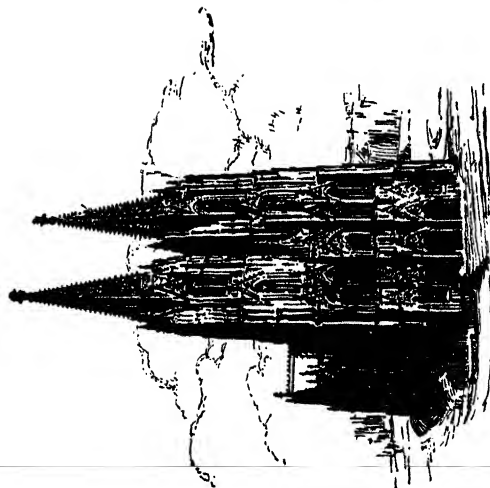


•The Iron Chancellor•

Coat of Arms
of
Former Empire



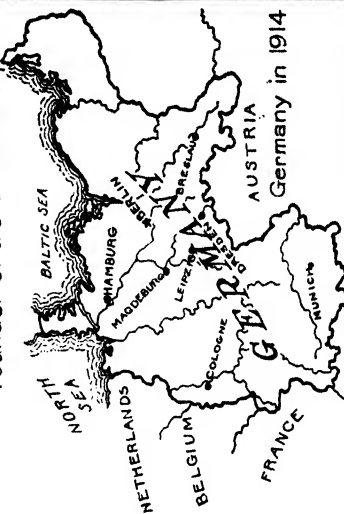
William I
Founder of the German Empire



Germany's Most Beautiful Cathedral,
Cologne



William II
The Last of the Hohenzollerns



Germany in 1914

CHRONOLOGICAL SUMMARY

GERMANIC CONFEDERATION
1815
FIRST GERMAN PARLIAMENT
1848
SOCIALISM APPEARED
1870
GERMAN EMPIRE FOUNDED
1871
BISMARCK BECAME CHANCELLOR
1871
ACQUISITION OF ALGERIA
1871
REVOLUTION IN SOUTH AFRICAN COLONIES
1904
TRIUMPH OF SOCIALISTS
1912
WORLD WAR BEGUN BY GERMANY
1914

ceeding Chancellors, Germany's vigorous foreign policy was continued.

The World War. In 1914 Germany was one of the most prosperous nations in the world. Its factories were busy, its ships were found all over the world, and its people were well fed and well clothed. There was little industrial unrest in the country, as the rate of unemployment was very low. Political unrest there was, however, because of restrictions as to suffrage, inequality of representation, etc., and the Social Democrats were opposing the militarist policies of the government. In 1913 an army bill had been passed authorizing a great increase in the standing army, a measure which caused consternation elsewhere in Europe but strengthened the Pan-Germans and "Junkers," who were openly working for the expansion of Germany. The outbreak of the war (for details, see *WORLD WAR*) found Germany superbly prepared, and when the decisive step was taken all parties rallied to the support of the government.

The breakdown of German morale after four years of seeming unity and enthusiastic adherence to the cause may be attributed to several things. The allied blockade caused a scarcity of food, raw materials and other necessities that weakened the people physically and made them less capable of bearing the terrible burdens of war. Again, the reckless promises of the military leaders regarding a speedy victory over the entente and the nonfulfilment of these promises, added to the growing dissatisfaction with autocratic rule, caused widespread unrest. America's entrance into the war had been minimized and ridiculed, and when soldiers home from the front told the facts the people lost what little confidence they still reposed in their leaders. President Wilson's speeches, too, had made a profound impression on the Socialists who were growing increasingly stronger and more outspoken. Before the great March offensive, Philipp Scheidemann, a Socialist deputy, had advised making peace on the basis of the "fourteen points," but he had been overruled.

After the failure of the 1918 offensive and the collapse of Bulgaria the government could no longer resist the demands of the war-weary people, and on September 30 a change was made in the Cabinet, Prince Maximilian of Baden, a man of democratic tendencies, becoming Chancellor. Socialists

were given other Cabinet positions, and appeals were made by the emperor for the people to hold firm.

On November 7 the managing committee of the Socialists informed the Chancellor that Emperor William must abdicate. Unable to withstand the pressure, the imperial government collapsed, and a provisional-coalition Socialist Cabinet was formed with Friedrich Ebert at its head. On November 11 Germany signed the Armistice.

Later Events. The Weimar Constitution (see page 1497) was promulgated on August 11, 1919, and Ebert, first President of the German Republic, directed the government until his death in 1925. The year 1923 was marked by the French occupation of the Ruhr, depreciation of the mark to practical worthlessness, and paralysis of German trade and commerce. At this point the Reparations Commission appointed a committee to work out a new plan of debt payments. The resulting Dawes Plan which went into effect in 1924, was superseded by the Young Plan in 1929, but this was also beneficial only temporarily. On Ebert's death the German voters chose General von Hindenburg as their President.

When conditions seemed to point toward stability and progress, Germany became engulfed in the world depression. The temper of the people was indicated in the 1930 elections to the Reichstag, when the new National Socialist party (the Nazis) made striking gains on a platform calling for abolition of parliamentary government, repudiation of the Versailles Treaty and Locarno Pact, and withdrawal of Germany from the League of Nations. The rise to power of the Nazi leader, Adolf Hitler, is told elsewhere in these volumes in his biography, page 1702. From 1930 to 1933 there was a steady trend toward Hitlerism. In July, 1932, at the Lausanne Conference, Germany was virtually relieved of further payment of reparations. President Hindenburg, who had been reelected in April, capitulated to the demands of the Nazis in January, 1933, and on the 30th, with Hitler the new Chancellor, Germany entered upon the Third Reich. On March 23 the Reichstag voted him dictatorial powers for four years. When Hindenburg died, August 2, 1934, the Cabinet issued a decree uniting the offices of President and Chancellor, Hitler retaining his titles of Fuehrer (Leader) and Reichskanzler. A favorable plebiscite

on August 19 was interpreted by him as a mandate for life tenure of power.

Germany is now a totalitarian state. All opposition parties have been dissolved; laws are promulgated as decrees; the courts, the press, the schools and industry and labor are subject to Nazi control. The Reichstag has only advisory powers. Non-Ayranas, especially the Jews, are severely restricted commercially and culturally. State lines have been abolished and local control of education has been ended. The Treaty of Versailles was repudiated and the Rhineland reoccupied. The Protestant Church lost its independence, and in spite of a Concordat signed with the Vatican in 1933, providing for Catholic control of religious education, friction developed between the government and the Catholic authorities. Hitler openly supported the Fascist insurgents in the Spanish civil war, providing military supplies and airplanes. About 10,000 German volunteers served under the rebel commander, General Franco.

Related Articles. Consult the following titles for additional information:

CITIES AND TOWNS

Aix-la-Chapelle	Elberfeld
Altona	Ems
Augsburg	Erfurt
Baden	Essen
Barmen	Frankfort-on-the-Main
Bayreuth	Halle
Berlin	Hamburg
Bingen	Heidelberg
Blenheim	Kiel
Bonn	Königsberg
Bremen	Leipzig
Bremerhaven	Lubeck
Breslau	Magdeburg
Brunswick	Mainz
Carlsruhe	Munich
Cassel	Nuremberg
Charlottenburg	Oberammergau
Chemnitz	Posen
Coblenz	Potsdam
Cologne	Stettin
Danzig	Stuttgart
Darmstadt	Weimar
Dortmund	Wiesbaden
Dresden	Wittenberg
Düsseldorf	Worms

STATES

Baden	Palatinate
Bavaria	Pomerania
Brandenburg	Posen
Brunswick	Prussia
Hanover	Saxony
Hesse	Schleswig-Holstein
Mecklenburg-Schwerin	Württemberg

RIVERS AND MOUNTAINS

Alps	Main
Black Forest	Moselle
Danube	Oder
Elbe	Rhine
Harz	Riesengebirge
Jura	Vosges

HISTORY

Arminius	Blücher, Gebhard von
Augsburg Confession	Charlemagne
Balance of Power	Charles V
Berlin, Congress of	Ebert, Friedrich
Bethmann-Hollweg	Franco-German War
Bismarck-Schönhofen	Frederick I, II, III
	Frederick William

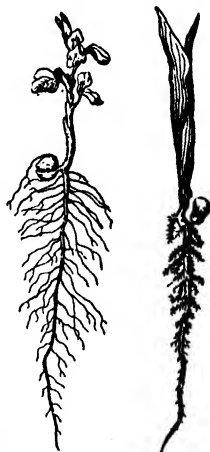
Frederick William I, III, IV	Liebknecht, Carl
Free Cities	Louis, The German
Golden Bull	Ludendorff, Erich
Hanseatic League	Luther, Martin
Henry III, IV, VI	Maximilian I
Hessians	Moltke
Hindenburg, Paul von	Reformation
Hitler, Adolph	Seven Weeks' War
Hohenstaufen	Seven Years' War
Hohenzollern	Succession Wars
Holy Alliance	Thirty Years' War
Holy Roman Empire	Triple Alliance
Hussites	William I, II
	World War

GERMINATION, *jur min a' shun*, the process by which the vegetable germ begins to develop into a plant. The conditions of germination are moisture, warmth and oxygen. The germ, which consists of a single cell, first shows evidence of germination by swelling. It then divides, becoming a two-celled *embryo*. One or both cells then grow to mature size, in process of which growth the cell casing is broken. The two parts separate; the young plant emerges from one and draws its supply of nourishment from the other, called the *cotyledon*.

The bean and squash afford good examples of one type of germination for seeds having two cotyledons. In the bean the nourishment is stored in the cotyledons in such a way that these appear above ground with but slight changes in form or color. As the nourishment is absorbed these leaves wither and fall; in the meantime the first pair of true leaves has developed and the root has taken hold on the soil, so that the plant is prepared to obtain its nourishment from the earth and air.

The pea represents another type of dicotyledonous seeds. Here the cotyledons are so full of nourishment that they cannot appear as leaves at all; they consequently remain in the ground while their nourishment is absorbed.

Indian corn affords a good illustration of germination with only one cotyledon. In this case the nourishment is stored at one end of the seed, the large end of the kernel; it is absorbed while the seed remains under ground, and as in case of the pea, the first leaf appearing is a true leaf of the plant.



PEA AND CORN

The food of a plant is stored in the seed in the form of starch and albumen, both of which are insoluble. Before these substances can be available for nourishment they must be changed into soluble compounds. When the seed is planted, it absorbs moisture and swells; fermentation sets in, oxygen is absorbed and the starch is changed to sugar and dextrin, both of which are soluble. These chemical changes are accompanied with a rise of temperature. After a few days the seed bursts open and the sprout or plumule appears. This is frequently called the radicle, though it is not the root. The direction of the plumule is at first downward, but it soon bends upward, and at the point of curvature it sends out a second shoot, which forms the rootlet.



BEAN

GERMS, *germs*, minute vegetable organisms which are responsible for all infectious diseases. In popular language the term is used in the same sense as bacteria.

Related Articles. Consult the following titles for additional information:

Bacteria and Diseases of	Germs Theory
Bacteriology	Plants of Disease
Disease	

GERM THEORY OF DISEASE, the theory that certain diseases are communicated from an infected person to an uninfected one by living organisms which gain access to the body of the afflicted person by the air, food or drink, and which, growing and multiplying in the body they invade, produce changes characteristic of special diseases. The period during which the organisms retain their vitality, like the rate of their growth and multiplication, varies in different cases, but it is limited in all. Few, if any, resist the destructive influence of a temperature of 300° F., while most succumb at the temperature of 200° or even less, particularly if exposed for some time. The living organisms, known as bacteria, microbes, micro-organisms or germs, are divided into several classes.

Doctor Koch, of Berlin, published in 1876 a paper giving a full account of the life history of the organism which had been observed in animals dead of splenic fever; and in 1877 the great French chemist Pasteur

proceeded to investigate the subject, and his investigations conclusively support the germ theory of disease. In 1882 Doctor Koch announced the discovery of a micro-organism believed to be the chief, if not the only, cause of consumption of the lungs. These microbes are found not only in the lungs of persons who have died of tuberculosis, but also in the sputum of tubercular and consumptive patients, and they multiply by spores. Thus it is that the sputum of a consumptive patient, even after it has dried up, may be capable of imparting the disease, owing to spores being scattered in the air.

After the epidemic of cholera in Egypt in 1883, which spread to France and Italy, investigations were undertaken by French, German and British commissioners. Doctor Koch detected a peculiar bacillus, shaped like a comma (,), in the intestines of persons who had died of cholera, and he believed that this bacillus was the active agent in the production of the disease. In similar fashion diphtheria, lockjaw, pneumonia, typhoid fever and other diseases have been proved to be of bacterial origin. Hydrophobia, measles, scarlet fever, smallpox and whooping cough and other diseases are attributed to germs which have not yet been fully identified. Indeed, investigation shows that every infectious disease is due to some form of micro-organism, and that there is one particular organism for each particular disease. Each organism produces its own disease and none other; and the special disease cannot arise unless its germ has entered the body.

The channels through which these germs obtain entrance are innumerable, but they have one origin and one only, and that is a preceding case of disease. The "germ theory" affords the hope and suggestion of a method of diminishing, if not of eliminating such diseases altogether, and to some extent it also indicates the direction in which their cure is to be sought. If the particular microbe of each disease were known, the condition of its life and activity understood, there is great probability that its multiplication in the living body could be arrested and the disease could thus be cured. Even without such knowledge, however, the germ theory indicates that the means for arresting the spread of infectious diseases and diminishing their occurrence consist in preventing the spread of the germs from an existing case of disease.

Related Articles. Consult the following titles for additional information:

Antiseptic	Medicine (with list)
Antitoxin	Sanitary Science
Bacteria and	Serum Therapy
Bacteriology	Surgery

GEROME, *sharomé'*, JEAN LEON (1824-1904), a celebrated French painter and sculptor, born at Vesoul. After study at Paris he traveled in the East, where he obtained the material for most of his pictures. Many of his canvases are large, and all are faithful and scholarly representations of the phases of life they depict. Among the most famous are *Gladiators before Caesar*, *Slave Market at Rome*, *Cleopatra and Caesar* and *The Duel after the Ball*.

GERONIMO, *je ron'í mo* (?-1909), an Apache chief, who from 1884 to 1886 terrorized the settlers in New Mexico and Arizona. In the latter year General Crook with a force of regulars was sent against Geronimo's band. The terms of surrender were agreed upon, but before they could be carried out the Indians escaped. General Miles, who succeeded Crook, organized a vigorous campaign against the old chief; a detachment of troops captured him, and he was sent first to Fort Pickens, Fla., and later to Fort Sill, Okla.

GERRYMANDER, a word used in the United States to denote an unfair distribution of election districts within a state, to give advantage to a political party. The word was first used in 1812, when, under the administration of Governor Elbridge Gerry, the Republicans and Federalists being nearly equal in strength in Massachusetts, a redistribution of senatorial districts was made, so that those counties that returned large Federalist majorities were grouped together, thus reducing the representation of the Federalist party in the legislature. One district under the new law was so irregular in outline that it somewhat resembled a salamander, hence the name *gerrymander*, using the name of the governor in derision. This scheme for perpetuating the power of a political party has frequently been used since that time.

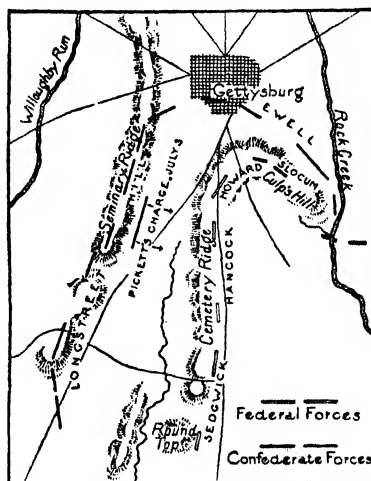
Elbridge Gerry (1744-1814), an American statesman, born in Marblehead, Mass. He was graduated at Harvard in 1765, and was a member of the Continental Congress of 1776.

Gerry was a delegate to the Constitutional Convention, but did not approve of the instrument and refused to sign it. In 1789 the Anti-Federalist party elected him to the

First Congress. He was one of the envoys sent in 1797 to establish diplomatic relations with France. His colleagues, Marshall and Pinckney, being Federalists and out of sympathy with France, were ordered to quit France, but Gerry was permitted to remain; and he did remain, to the indignation of many Americans, until his recall was ordered. Elected governor of Massachusetts in 1810, Gerry, who was a keen partisan, took the lead in forming election districts from which the word *gerrymander* was derived. He was defeated in 1812, but his party elected him to the Vice-Presidency of the United States, in which office he died.

GETHESEMANE, *geth sem'a ne*, in Biblical literature, an olive grove near Jerusalem, a favorite resort of Christ and His disciples, and the scene of Jesus' agony on the night before His crucifixion. The spot which the travelers' guides to-day call Gethsemane is a walled enclosure 150 by 140 feet, containing eight very old olive trees, which by some are believed to have been there in the time of Christ.

GETTYSBURG, BATTLE OF, a decisive battle of the American Civil War, fought July 1-3, 1863, at Gettysburg, Pa., between



BATTLE OF GETTYSBURG

the Federal army of the Potomac, numbering about 93,000 men, under General Meade, and the Confederate army of Northern Virginia, numbering about 80,000 men, under General Lee. On July 1, the two armies came together at the little village of Gettysburg, the Federals having closely followed

the Confederates in their advance northward from Fredericksburg. The Federals occupied a strong position on a line of bluffs south of the town; the Confederates formed their lines on a parallel ridge, about a mile distant. On July 2, the Confederates made a vigorous attack, drove back the Union left and gained a position on the right which seriously menaced the whole line. On the morning of the third, the Northern soldiers drove the Confederates out of this advanced position and repulsed a brilliant charge by Pickett's men against the center of the line or Cemetery Ridge. After this Lee was compelled to retreat across the Potomac. This battle marked a turning point in the Civil War. The total loss on the Federal side was 3072 killed, 14,497 wounded and 5434 captured or missing. The loss on the Confederate side was 2,592 killed, 12,709 wounded and 5,150 captured or missing. See CIVIL WAR IN AMERICA.

GETTYSBURG ADDRESS, a brief speech delivered by Abraham Lincoln on the occasion of the dedication of the National Cemetery on the field of Gettysburg, November 19, 1863. Although it contains but 267 words, it ranks as one of the world's masterpieces of oratory. The President did not expect to speak at the dedication; Edward Everett was to be the orator. When informed that he would be expected to follow Everett with a brief statement, it is said that he wrote his speech on the back of an envelope while on the train which carried him to the scene. It follows:

Fourscore and seven years ago, our fathers brought forth on this continent a new nation, conceived in liberty, and dedicated in the proposition that all men are created equal. Now we are engaged in a great civil war, testing whether that nation, or any nation so conceived and so dedicated, can long endure. We are met on a great battlefield of that war. We have come to dedicate a portion of that field as a final resting-place for those who here gave their lives that that nation might live. It is altogether fitting and proper that we should do this. But in a larger sense we cannot dedicate, we cannot consecrate, we cannot hallow this ground. The brave men, living and dead, who struggled here, have consecrated it far above our poor power to add or detract. The world will little note, nor long remember, what we say here, but it can never forget what they did here. It is for us, the living, rather to be dedicated here to the unfinished work which they who fought here have thus far so nobly advanced. It is rather for us to be here

dedicated to the great task remaining before us,—that from these honored dead we take increased devotion to that cause for which they gave the last full measure of devotion,—that we here highly resolve that these dead shall not have died in vain,—that this nation, under God, shall have a new birth of freedom,—and that government of the people, by the people, for the people, shall not perish from the earth.

GEYSER, *gîzur*, a spring which at intervals throws out quantities of hot water and steam. A geyser has a funnel-like opening, which extends to hot rocks below the surface. It was probably formed by the water which, when hot, dissolved the siliceous matter. The eruptions occur at intervals, being regular in some geysers and very irregular in others. They are usually more frequent in small than in large springs. Various theories have been advanced to account for the eruption, but all agree that it is caused by steam, the difference in theories being as to the way in which the steam acts. It is altogether probable that as the opening fills with water and becomes closed, the pressure causes the water at the bottom to become hot far above the boiling point (which see) at the surface. The temperature continues to increase until finally a small portion of steam escapes and forces some of the water out of the funnel. This in a measure relieves the pressure and the high temperature of the water causes it instantly to be converted into steam, which forces the water out through the funnel, often throwing it to the height of two hundred feet or more. The duration of an eruption varies from a few minutes in a small geyser to some hours in the largest. The water holds siliceous matter and carbonate of lime, which it deposits about the crater, making beautiful and fantastic formations, varying in color from white to blue and yellow.

The geyser regions of the world are found in Iceland, New Zealand, and in and about Yellowstone National Park in the United States. The last is by far the most remarkable and the most widely known. In 1904 a new geyser made its appearance in New Zealand, which is claimed to be larger than any other in the world. For a description of the geyser region of the Yellowstone, see YELLOWSTONE NATIONAL PARK.

GHATS, *gahts*, or **GHAUTS**, *gawts*, two ranges of mountains in the peninsular portion of British India. They extend parallel with the east and west coasts. The general

elevation of the Western Ghats varies from 4,000 to 5,000 feet. They form a watershed, and the rain collected on the eastern slopes makes its way across India to the Bay of Bengal. The Eastern Ghats have an average height of 1,500 feet and extend for a distance of 500 miles.

GHEBERS, *ge'burz*, or **GABERS**, *ga'burz*, a name given to the fire worshipers of Persia, represented in India by the Parsees (which see). The original Ghebers or followers of Zoroaster are now represented almost solely by the few who inhabit the cities of Yazd and Kirman and the adjoining villages. Among the leading practices of the Ghebers may be mentioned their refusal to contract marriages with those of other creeds and their objection to eating beef or pork or to partaking of anything cooked by one of another religion.

GHENT, *gent*, BELGIUM, officially known as GAND, capital of the province of East Flanders. It is situated in a fertile plain at the junction of the Lys and Scheldt rivers, thirty-one miles northwest of Brussels. The city is divided by canals into a number of islands, connected with one another by bridges. Among the notable buildings are the Cathedral of Saint Bavon; the Church of Saint Nicholas (begun in the tenth century); the Church of Saint Michael; the university, a handsome modern structure with a library of about 100,000 volumes and 700 manuscripts; the Hôtel-de-Ville; the townhall; the Palace of Justice, and the Institute of Sciences. It also has many parks, gardens and promenades.

For many years this city has been widely known as a center for the production of cotton and linen goods and lace, though it had declined somewhat from its former prosperity. Other industries of importance are sugar refining and the making of hosiery, thread, ribbons, instruments in steel, carriages, paper, hats and delft ware, and the raising and exportation of flowers. Ghent was founded before the seventh century, was fortified by Baldwin, first Count of Flanders, in the ninth century, and took a prominent part in European history, especially in the struggle for religious and political liberty. In 1792 the Netherlands fell under the power of France, and Ghent became the capital of the Department of Escant (Scheldt). In 1814 it became, along with Flanders, part of the Netherlands, till

the separation of Belgium and Holland. The treaty which ended the War of 1812 was signed here.

Though the city was occupied by the Germans early in the World War, it escaped bombardment, as no resistance was offered the invaders. In 1918 it was evacuated by the invaders, and restored to Belgium. Population. 1933. 169,648.

GHENT, TREATY OF, a treaty between the United States and Great Britain, at the end of the War of 1812, signed December 24, 1814, and ratified February 17, 1815. It restored all territory to its ante-bellum owners, except certain islands, provided for commissions to settle boundaries, and bound both parties to attempt the abolition of the slave trade. It failed, however, to dispose of the chief causes of the war, the impressment of American seaman, the fishing by Americans in Newfoundland waters and the rights of neutrals.

One of the great battles of the war, the Battle of New Orleans, was fought after the treaty was signed and before news of the event reached America.

Related Articles. Consult the following titles for additional information:
Impressment of Seamen War of 1812
New Orleans, Battle of

GHETTO, *get'o*, the Jewish quarter of a large city. In the Middle Ages the Jews living in towns and cities were assigned to separate quarters, outside of which they were not permitted to take up residence. The name Ghetto was applied to these sections, and is used to-day to designate any large section occupied almost exclusively by Jews of the poorer classes.

GHIBELLINES, *gib'el linz*. See GUELPHS AND GHIBELLINES.

GHIBERTI, *ge bair'te*, LORENZO (1378-1455), an Italian goldsmith and sculptor, born at Florence, where most of his best work, including frescos, painted glass and bas-relief, may to-day be seen. In 1401 the society of merchants at Florence invited artists to propose models for the bronze doors of the baptistry of San Giovanni. The judges selected the works of Brunelleschi and Ghiberti, but Brunelleschi withdrew. After twenty-one years' labor Ghiberti completed the doors, which Michelangelo said were worthy to adorn the entrance of paradise. The first door consists of twenty-eight panels, representing the life of Christ,

the fathers of the Church and the evangelists. Ghiberti was afterwards commissioned to design the east doors, which he embellished with scenes from the Old Testament, several called *Creation of Adam*, *Creation of Eve*, *Fall of Man*, *Expulsion from Paradise* and *Moses upon Sinai*.

GHOSTS. A belief in the return of the dead in the visible form of wraiths has been common to many races from the very earliest times. It has had an important part in some so-called religious beliefs and has led to the development of various religious theories, such as ancestor worship, belief in immortality, witchcraft, nature worship and totemism.

The origin of belief in ghosts is difficult to trace. The idea of the separation of the soul and the body may have developed through the phenomena of dreams, in which the mind, or soul, seems to leave the body and have independent experiences. Ghosts, it is declared, assume in course of development a terrible character. Unhindered by natural laws, they are able to compass instantly the distance between places far apart. These beliefs eventually led to the notion that ghosts possess remarkable superhuman powers, and among the superstitious great care is exercised to gain the good will of departed spirits to prevent them from exerting a malignant influence upon the living. Special fear is felt for the spirit of one who died a violent death or had been concerned with murder. This feeling still survives among primitive minds, conspicuous examples being exhibited in wild stories of haunted houses. No person of intelligence admits the possibility of such things.

Related Articles. Consult the following titles for additional information:

Ancestor Worship Totem Witchcraft

GIANTS, *jǎnts*, people of extraordinary stature. Taking the human race as a whole, the average height of the adult male is about five feet five inches. Each race, however has an average height of its own, which changes little from generation to generation and which often varies considerably from the general average of all men. Thus, the difference between the extremes, the Scotch (sixty-nine and five-tenths inches) and the Batwas of Africa (fifty-one inches) is over eighteen inches.

Notable deviations from the medium height are not at all uncommon, especially among

the Teutonic peoples. The following are among authentic instances, ancient and modern, of persons who attained to the stature of giants: the Roman emperor Maximinus, a Thracian, nearly nine feet in height; Patrick Cotter (1761-1804), ninety-nine



GIANT IN BATTLE WITH ARTEMIS
From a relief in the Vatican, Rome.

inches; Anna Swan, a native of Nova Scotia, above eight feet high; her husband, Captain Bates, a native of Kentucky, of the same height; Chang-wu-gon, the Chinese giant, seven feet nine inches high. Probably the tallest man whose size is definitely recorded is a certain Finlander who reached the height of nine feet four inches. Gigantic stature is generally accompanied by a want of proportion in parts, some parts growing too quickly for others, or continuing to grow after the others have ceased. The relation between the upper and lower half of the body is not disturbed, but the skull, brain and forehead are relatively small, the jaws very large, the shoulders, breast and haunches very broad and the muscular system comparatively weak.

The giants of Greek and Norse mythology were, of course, merely symbols, representing benignant or hostile forces of nature. Sometimes by the Greeks the term *giant* was applied to a man of great strength, even if he were not of gigantic size.

GIANTS' CAUSEWAY, *kawz'wa*, a remarkable natural promontory, projecting from the north coast of County Antrim, Ireland. It is formed by a mass of basalt from 300 to 500 feet in thickness. The causeway extends for about 300 yards and is formed of the tops of about 40,000 closely fitting

basaltic columns. The diameter of the columns varies from fifteen to twenty inches. The entire structure is divided into three causeways, known as the Little Causeway, the Middle Causeway, or Honeycomb, and the Grand Causeway. In the Middle Causeway an arrangement of columns forms a chair, known as the Wishing Chair. Another arrangement of columns forms what is called the Giants' Loom, and still another, the Giants' Well, and another the Lady's Fan. The promontory takes its name from an ancient legend which attributed its construction to giants, who commenced to build a road across the channel to Scotland.

GIBBON, a tailless anthropoid ape, found chiefly in India, Burma and the Malay Archipelago. One species inhabits the island of Hainan, in the China Sea. The gibbon has a small, slender body, weak legs and extraordinarily long arms which reach nearly to its ankles and enable it to swing from tree

published his first work, an essay on the study of literature, written in French. While visiting Italy, in 1764, he conceived the idea of writing the history which became *The Decline and Fall of the Roman Empire*. The first volume was published in 1776 and a complete edition was issued in 1788. Distinguished by breadth of knowledge, fine scholarship and power of organization, this work is a standard authority on the thirteen centuries of Rome ending with the fall of Constantinople. Its greatest defect is the author's failure to give due credit to the rôle of Christianity in the progress of civilization. Gibbon also wrote an autobiography which was published after his death.

GIBBONS, JAMES (1834-1921), an American Roman Catholic cardinal, born in Baltimore, and educated for the priesthood at Saint Charles' College and Saint Mary's Seminary in Maryland. He was ordained a priest in 1861 and thereafter served as priest of



A GROUP OF GIBBONS

to tree with wonderful agility. Its color is usually black, with the face surrounded by a white or gray beard. One species has white hands. At night gibbons congregate in bands and fill the air with their shrill cries. They feed on leaves and fruit. They are interesting to watch in zoölogical gardens, but do not stand captivity well. See APE.

GIBBON, EDWARD (1737-1794), an English historian, famous as the author of a great history of imperial Rome from the reign of Trajan. He was born at Putney, Surrey. Until past fourteen he had delicate health, and supplemented an irregular schooling by wide reading. At the age of fifteen he was sent to Magdalen College, Oxford, from which he was expelled for embracing Roman Catholicism. Gibbon's father then placed him under the guidance of a Calvinist minister at Lausanne, by whom he was reconverted. In 1758 he returned to England, and in 1761 he

Saint Patrick's Church, Baltimore, and in Saint Bridget's Church, Canton, near Baltimore. After acting as secretary to Archbishop Spalding, he was made chancellor of the archdiocese and later assistant chancellor of the plenary council which met in Baltimore. In 1868 he was made bishop of North Carolina and four years later, bishop of the see of Richmond. On the death of Archbishop Bailey, whose coadjutor he had been, Gibbons became head of the see of Baltimore, and thus he became the head of the Roman Catholic Church in North America. In 1886 Gibbons was created a cardinal by Leo XIII. He was the author of *The Faith of Our Fathers*, *Our Christian Heritage* and *The Ambassador of Christ*.

Cardinal Gibbons was not only the best-known of American Roman Catholics, but his leadership brought to him an influence which was recognized outside the Church.



GIBRALTAR, *jib rawl'tur*, the world's strongest natural fortress, situated at the Atlantic entrance to the Mediterranean Sea. Its formidable character has passed into a proverb; the phrase, "as strong as Gibraltar," leaves nothing to be added.

There is here a mighty rock promontory, and at its base is the town of Gibraltar. Great Britain owns the rock; back of it

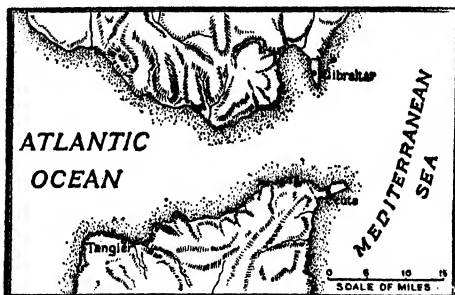
is a strip of neutral territory one and one-half miles long and nearly a mile wide, and behind this lies the mainland of Spain. The highest point of the rock, which is of gray marble, is about 1,400 feet above sea level; its north face is almost perpendicular, while its east side exhibits tremendous precipices. On its south side it is almost inaccessible, making approach from seaward impossible; the west side, although very rugged and precipitous, slopes toward the sea; and here the rock is protected by powerful batteries, rendering it apparently impregnable. Numerous caverns and galleries, extending two to three miles in length and of sufficient width for vehicles, have been cut in the solid rock, with portholes at intervals of twelve yards, bearing upon the neutral ground and the bay and mounted with more than 1,000 guns of the largest size and finest pattern. The peace-time force numbers 3,750, military and naval.

The town of Gibraltar is situated on the west side of the peninsula, terminating in Europa Point, and thus it fronts the bay. It consists chiefly of one spacious street, about a mile in length. Gibraltar is a free port and has a considerable shipping trade. The chief export is wine. The administration is vested in the governor, who is also commander in chief of the troops. The civil English population was 15,143 in 1933.

Gibraltar, known to the Greeks as Calpe, was one of the famous "pillars of Hercules" (see **HERCULES**, **PILLARS OF**). It was first fortified as a strategic point by the Saracen leader, Tarik ibn Ziyad, in 711, from whom it was thenceforward called the "Rock of Tarik." It was ultimately captured by the Spaniards from the Moors in 1462, fortified in the European style and much

strengthened. It was taken, however, in 1704 by a combined English and Dutch force, and was secured to Britain by the Peace of Utrecht in 1713. In 1779 a siege was begun by Spanish and French forces; it lasted till 1783, but failed.

GIBRALTAR, STRAIT OF, the channel which forms an entrance from the Atlantic into the Mediterranean. The narrowest part is a little to the west of Gibraltar, and



is fifteen miles wide. A strong and constant current flows into the Mediterranean from the Atlantic Ocean, in the middle of the strait, but the under current, as well as two feeble lateral currents along the coast, set toward the ocean.

GIBSON, CHARLES DANA (1867-), an American illustrator, born at Roxbury, Mass. He studied at the Art Students' League in New York and in 1886 began to draw for periodicals. Later he studied in Paris, London and Munich. He created the type of feminine beauty known as the "Gibson girl," which has enjoyed a wider popularity than any other single type in American magazine illustration. Mr. Gibson has published several volumes of clever illustrations depicting society types. In 1920 he purchased the illustrated weekly, *Life*. Among his published works are the *Education of Mr. Pipp*, *A Widow and Her Friends*, *The Social Ladder*, *London as Seen by C. D. Gibson* and *People of Dickens*.

GIDEON, *gid'e un*, a Bible character who figures in a stirring and picturesque tale of the Old Testament. Called by God to deliver the Israelites from the Midianites, he led to battle 300 picked men, each of whom was armed with a sword, a trumpet and an earthen pitcher containing a lamp (see *Judges VII*, 19). Later Gideon was made the fifth judge of Israel. *Gideon's Band* is the name adopted by a religious organization

of traveling men, founded in 1899 at Bos-cobel, Wis. Through their efforts Bibles have been placed in the guest rooms of hotels throughout the United States and in parts of Canada and England.

GILA, *he'lah*, a North American river which rises in the Sierra Madre Mountains in New Mexico and flows westward for about 500 miles, uniting with the Colorado. Curious ruins of stone-built houses of a former age occur all along its banks. See CLIFF-DWELLERS.

GILA MONSTER, a poisonous lizard of New Mexico, Arizona and Texas, and one of the largest lizards in North America. It is a repulsive animal, usually about a foot in length, though often larger, with a fat tail and short, weak legs. Its scales are brilliant orange and jet black. It has grooved teeth and highly developed salivary glands at their bases. The bite of the animal brings quick death to small mammals and birds, and is very serious, though seldom fatal, to man.

GILBERT, HUMPHREY, Sir (1539-1583), an English navigator and explorer. He was a man of liberal education and attained distinction in the English army during several campaigns. He became interested in the search for a route to India and in 1578 received a commission from Queen Elizabeth to conduct an expedition. His first adventure met with mishap, but after a few years a second expedition, in which both Raleigh and Gilbert were interested and which was under Gilbert's personal command, sailed for America. He planted a colony near Saint Johns, Newfoundland, but it proved a failure, and after a few weeks Gilbert set out for England. He encountered a storm, in which he perished.

GILBERT, WILLIAM SCHWENCK (1836-1911), an English playwright, best known for librettos written in collaboration with Sir Arthur Sullivan, the composer. He was graduated from London University and from there went into government work. His leisure moments were spent in writing comic verses and plays. His work with Sullivan dates from 1875. Their most famous musical comedies are *Pinafore*, *The Pirates of Penzance* and *The Mikado*, all of which have been tremendously popular. *Pinafore* has been given in nearly every civilized country; at one time ninety companies throughout the United States were producing it. *The Mikado* was equally popular. The Gilbert

and Sullivan partnership continued until the death of the latter in 1900.

GILDING, the art of covering a surface with a thin layer of gold for the purpose of ornamentation. There are several methods of applying gold, depending upon the surface to be covered. In general they may be designated as *chemical* and *mechanical* gilding.

Chemical gilding embraces those processes in which the gold is at some stage in a state of chemical combination. It is in some cases applied cold; some applications require heat. Cold gilding is used for gilding metals, wood and other surfaces which cannot stand a high degree of heat; also for gold plating. The processes are long and complex. Gilding requiring heat is used in the decoration of pottery and porcelain. The beautiful pure gold, such as that used on table china is prepared by pulverizing it, then mixing it with oxide of bismuth, borax and gum water. It is applied like paint, with a camel's hair brush, and the decorated article is then put into a kiln and burned for several hours at high temperatures.

Mechanical gilding consists of applying gold leaf directly to a surface, such as masonry, wood or ivory, which has been prepared with a size. The gold leaf is placed on the size while the latter is damp, so it will adhere. In this process various substitutes for gold are frequently employed. The leaf is cut in small pieces and carefully applied to the surface specially treated to receive it, by means of special tools. It is then brushed to remove particles of dust or fragments, and is then varnished.

The art of gilding is very old. It was known to the ancient Egyptians, Persians, Greeks and Romans, who used it extensively for architectural ornament and for interior decoration. Two conspicuous modern examples of architectural gilding are in Saint Peter's Cathedral, Rome, and in the Congressional Library at Washington, D. C. Numerous domes of public buildings in America and Europe are covered with gold leaf.

GIL'EAD, a mountainous region east of the River Jordan, granted to the tribes of Gad and Reuben and a part of the tribe of Manasseh, when the Israelites took possession of the Promised Land (see *Numbers XXI*, 21). During all the history of the Israelites, Gilead was a sort of land of asylum, to which

those who were not in harmony with the government could flee. It was the refuge for Absalom when he fled from his father, and during Absalom's rebellion it served David for a similar purpose. It was the home of Elijah and Saul, and Saul with his sons was buried there. The familiar expression "Is there no balm in Gilead?" means "Is there no place of refuge?" See PALESTINE.

GILLETT, *gil'et*, FREDERICK HUNTINGTON (1851-1935), an American congressman, elected Speaker of the House of Representatives in 1919, by the Republican majority, on the organization of the Sixty-sixth Congress. He was born at Westfield, Mass., and was graduated at Amherst College in 1874. In 1877 he received the degree of LL.B. at Harvard, and the same year opened a law office at Springfield, Mass. From 1879 to 1882 he was assistant attorney-general of Massachusetts, and later served in the state house of representatives. In 1893 he took his seat in the national House of Representatives, and in 1924 was elected to the United States Senate.

GILLETTE, WILLIAM HOOKER (1855-1937), for years a leading figure on the American stage, and a gifted playwright. He was born at Hartford, Conn., was given an academic education, and while playing in stock companies in New York and Boston took special university courses. His theatrical career began in 1877, and his productivity as a dramatist has been almost co-extensive with his stage experiences. His earlier plays, *The Private Secretary*, *Esmeralda* and *Because She Loved Him So*, were deservedly popular. *Secret Service* and *Held by the Enemy* are considered the best plays on the theme of the Civil War that have been written. One of Mr. Gillette's chief successes came with the production of a play which he dramatized from Sir Arthur Conan Doyle's stories of "Sherlock Holmes."

GILLS, the breathing organs of animals which obtain their oxygen from water. In fishes, the gills consist of cartilaginous or bony arches, attached to the bones of the head and furnished on the outer, convex sides with a multitude of fringed, vascular fibers, resembling plumes. When healthy, these are of a red color. The water is admitted by gill-openings, and as it circulates through the plumelike parts of the gills, the oxygen is extracted from it. The crustaceans, the mollusks and the amphibians in

certain portions of their lives are furnished with gills. See FISH.

GILMAN, DANIEL COIT (1831-1908), a distinguished American educator, was born at Norwich, Conn., educated at Yale University and made professor of physical and political geography in that institution. He held the position until 1872, when he became president of the University of California. From 1875 until 1901 he was president of Johns Hopkins University. On the establishment of the Carnegie Institution in the latter year Dr. Gilman became president and served two years. He was president of the American Oriental Society and a member of the British Association and of several other similar organizations of high rank.

GIN, *jin*, a spirit distilled from grain and usually flavored with juniper berries. It is largely manufactured in Holland. A low-grade spirit sold under the name of gin consists of diluted alcohol flavored with salt and oil of turpentine; this is often called "nigger gin" in the Southern states of the American Union.

GINGER, *jin'jur*, a plant that grows in moist places in various parts of tropical Asia and neighboring islands and which has been introduced into the West Indies (particularly Jamaica), South America and West Africa. It is a reed-plant with white, purple-streaked flowers and knotty rootstocks. From these rootstocks is obtained the ginger of commerce.

GINGHAM, *ging'am*, a summer fabric widely used as a material for children's and women's dresses and aprons. Gingham differs from calico in having the colors woven with the fabric, not printed on it. The patterns are various—sometimes in fancy designs, sometimes checkered, often striped. Originally ginghams were made only from cotton, but cotton and silk or silk and ramie are now used in making fancy weaves. The people of the United States are constant



THE GINGER PLANT

buyers of gingham, and the country manufactures about 550,000,000 yards annually.

GINKGO, *jink'go*, a Japanese tree, often cultivated in the United States on account of its beautiful foliage, which has the appearance of maidenhair fern. In China and Japan the tree was once regarded as sacred, and was planted in the temple gardens.

GINSENG, *jin'seng*, the yellowish root of a low herb belonging to the same family as the wild sarsaparilla. In China ginseng is valued as a remedy for sickness, and the people of that country import large quantities from the United States, where ginseng cultivation is a profitable business. The roots have been sold for as much as ten dollars a pound. The name comes from the Chinese for *likeness of a man*, for some of the roots bear a fancied resemblance to a human being. Superstitious Chinese will pay extra prices for roots of such form.

The plant grows wild in America from the mountains of Georgia to the Saint Lawrence Valley, and as far west as the Mississippi. Both wild and cultivated ginseng is gathered for export, but the cultivated varieties bring the best prices. The plant does well in a loose, well-drained soil containing humus, potash and phosphoric acid. Plants grown in the open need a lattice-work covering to protect them from the sun's heat. As it takes six years for the plant to reach maturity, the grower must expect to wait for returns on his investment.

GIORGIONE, *jawr joh'na*, (1477-1511), whose real name was GIORGIO BARBARELLI, was one of the greatest painters of the Italian Renaissance. He grew up in Venice, where he became a pupil of Giovanni Bellini and identified with the Venetian School. His position in Venetian art is analogous to that of Leonardo in Florentine painting. With both the picture represented an idea, and detail was subordinated to general effect. Giorgione's pictures rarely tell a story, but embody a mood and make their appeal through beauty alone. His art expressed all the charm, the grace, the splendor of the Venice of his day. Of the 150 pictures attributed to him, only a few are unquestionably from his hand. These are an altar piece in the Cathedral of Castelfranco, *The Family of Giorgione* (Venice), *The Concert* (Pitti Palace), *Christ Bearing the Cross* (owned by Mrs. Gardner of Boston), and the *Sleeping Venus*, the last considered

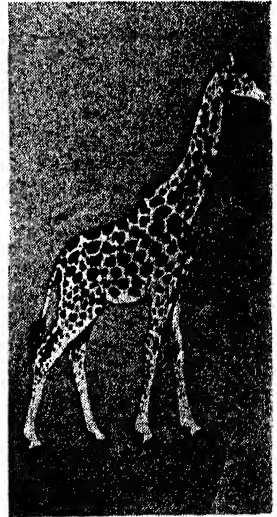
the most chaste representation of Venus in the art of the Italian Renaissance.

GIOTTO, *jot'to*, or **AMBROGIO DI BONDONI** (1266-1337), one of the most celebrated figures in Italian art. He was born at Vespignano, a village near Florence, at a time when the art spirit after its long sleep through the Middle Ages was beginning to awaken. For hundreds of years before Giotto art had been stiff and formal; human figures bore little resemblance to life. Giotto's great work was to make his representations naturalistic. He tried to paint his human figures lifelike, his draperies graceful and realistic, his landscapes true to nature; to draw his architectural details in proper perspective, and to improve color. His pictures appear almost childish compared with those of the great masters, such as Raphael; but he has been held in veneration by every painter since his day, by reason of his contributions to the development of the art of painting.

Despite its technical deficiencies, Giotto's art possesses one quality in which it is surpassed by few artists of later times, that of dramatic significance. This is conspicuous in his frescoes representing the life of Saint Francis, at Assisi, in the four allegorical frescoes in honor of Saint Francis, in his scenes from the life of Christ, in his frescoes in the Chapel of the Arena, Padua, and at Rome. Giotto was not only a painter, but an architect of note. He prepared the plans for the beautiful Campanile of Florence known as "Giotto's Tower."

GIPSY. See GYPSIES.

GIRAFFE, *jiraff* once called **CAMELOPARD**, a remarkable animal inhabiting Africa, the only species of its genus and family. It is the tallest of all animals, a full-grown male reaching the height of eighteen to twenty



GIRAFFE

feet. This great stature is mainly due to the extraordinary length of the neck, in which, however, there are but seven vertebrae. The animal has on its head two bony projections resembling horns. Because of its height it can easily feed on the leaves of trees, and in this it is further aided by its tongue, which is long and can be thrust far out of its mouth and curled about the twigs and leaves. When it browses on grass, to get its mouth down to the ground it has to stretch its fore legs far apart, a grotesque spectacle hugely enjoyed by children when watching the animal feeding in a "zoo." Its color is usually light fawn, marked with darker spots. The giraffe is a mild, inoffensive animal, and in captivity it is gentle and playful. The name *camelopard* is a combination of *camel* and *leopard*, for the giraffe is shaped something like a camel and is spotted like a leopard. However, this name is seldom applied to the animal, except in scientific circles.

GIRARD, jir'ard', COLLEGE, a college established in Philadelphia in 1848, under provisions made in the will of Stephen Girard (see below). It was originally instituted for the education of poor white orphan boys, and today it exists primarily as a school for training boys to earn their living. A peculiar provision of the will prevents any ecclesiastic, missionary or minister from having connection with the college, and clergymen are not even allowed to enter the grounds. This serves to keep the boys' minds free from denominational controversies. There is, however, daily chapel service; attendance is not compulsory.

Stephen Girard (1750-1831) was born at Bordeaux, France. When but thirteen years old he became a sailor, and in 1773 he was already master and captain of a vessel operating between New York, New Orleans and the West Indies. In 1777 he began his mercantile career in Philadelphia. He was heavily interested in the first United States Bank, and upon the lapse of its charter he bought most of its stock and its building and instituted the Girard bank. During the War of 1812 he placed its resources at the disposal of the government.

GIRASOL, jir'o sahl, a precious stone that reflects, apparently from its interior, bright red or yellow light. The name has been given to fire opal and to star sapphire. Girasols were once highly esteemed; now they are made artificially.

GIRL SCOUTS, an organization for girls, similar in purpose to the Boy Scouts (which see), with membership available to girls from ten to eighteen years of age. There is provision for a group of lower age limits, known as Brownies, whose activities are limited to self-help, aid in domestic arts, and to games for recreation.

The object of the Girl Scouts is "to bring to all girls the opportunity for group experience, outdoor life, and to learn through work, but more by play, to serve their community." When engaged in Scout activities, a dress and hat of distinctive design and color are worn. A unit of eight girls forms a patrol; patrols unite to form a troop, officered by a captain and lieutenants. The captain must be of legal age, trained for leadership. Membership is comprised within three grades—tenderfoot Scout, second-class Scout, and first-class Scout. Achievement in specified fields carries promotion; even the first-class Scout has opportunity to earn special awards. The motto of the Scouts is, "Be Prepared," the slogan, "Do a Good Turn Daily." Each member promises, on her honor, that she will try to do her duty to God and her Country; to help other people at all times; to obey the Scout laws.

GIRONDISTS, zhe roN'dists (from *Gir-onde*, a department of France), one of the great political parties of the French Revolution. The Girondists were moderate republicans, but were distinguished for visionary ideals, rather than for a well-defined policy; hence, they fell an easy prey to the more radical Jacobins. They were overthrown in June, 1793.

GIZ'ZARD, a digestive organ found in birds, certain insects, the earthworm and the crayfish. The gizzard of birds makes up for their lack of teeth. It is a muscular bag having a thick, membranous lining, and is located in the stomach. When the food has been moistened and softened in the bird's crop, it passes to the stomach to be mixed with gastric juice. It then goes into the gizzard, the thick walls of which crush it to a pulp, being assisted by gravel swallowed by the bird.

GLACIAL, gla'shal, PERIOD, or AGE OF ICE, a remarkable period of geologic time, during which portions of the earth were covered by immense ice sheets. This period is the connecting link between the present period and the one just preceding the Age

of Ice. Whether man existed then is unknown, but it is believed that the Glacial Period directly preceded the Age of Man.

Extent. At least 4,000,000 square miles of North America were covered by ice sheets. The ice, in most places thousands of feet thick, extended over all of Canada, and covered all of New England, New York,



GLACIAL FIELD IN NORTH AMERICA
Northern Pennsylvania, the eastern Mississippi Valley as far south as Ohio, Iowa, Minnesota, most of North Dakota, the northern part of Montana, Washington, the eastern parts of South Dakota and Nebraska, over half of Missouri and a part of Kansas. In Europe, Russia, the Low Countries, Germany, the Scandinavian Peninsula and the greater part of the British Isles were ice-covered, and there were small ice areas in Asia and South America.

The Record It Left. In the course of time the ice sheets began to move, the direction in each case being toward the lowest level. In the eastern part of the United States the general direction was to the southeast, while in the central portion it was to the southeast and southwest, showing a division in the ice sheet. In Canada the direction seems to have been toward the northeast. Wherever it existed the straight mass of ice in its movement leveled hills and moun-

tains, filled up valleys and lake beds in some places and hollowed them out in others. The rocks over which it passed were worn smooth and were scratched by the movement of the boulders which were frozen into the glacier. The scratches thus made are known as *striae*. Some of these are large furrows, while others are mere scratches on the rock. The glacier carried with it large quantities of rock and other debris, which were deposited wherever it melted. This accounts for many of the boulders in the Mississippi Valley and in the eastern portion of the United States, which are of an entirely different character from the rock of the surrounding region.

Possible Causes. The cause of the Glacial Period is not well understood, and various theories have been advanced to account for it. Among these are that the sudden elevation of the northern continents caused such a change in temperature as to cover the region with the ice; another is that the change in atmospheric and oceanic currents caused such a heavy rainfall over the cold portions of these continents as to form the glacier; and a still later theory is that the change in climate was due to a change in the relative positions of the earth and sun.

Related Articles. Consult the following titles for additional information:

Age of Man	Geology
Drift	Glacier
Erosion	Moraine

GLACIER NATIONAL PARK, one of the most beautiful of the reservations in the United States, situated in Northwestern Montana, 447 miles from Yellowstone National Park. It extends to the international boundary, where it joins the Rocky Mountains Park, in Alberta. It was created a national park in 1910, and has an area of 1,534 square miles, nearly 300 square miles greater than that of Rhode Island.

As the name implies, the most striking feature of the park is its glaciers, of which there are between seventy and eighty, the largest nearly five square miles in extent. Other scenic beauties are plentiful, for there are steep cliffs, dashing mountain streams, dozens of waterfalls, and over 250 lakes, surrounded by wooded mountains or rocky walls. The streams, the lakes, and Flathead River, which borders the park on the west, abound in fish, and the wooded sections contain many wild animals. Numerous trips have been mapped out, and the park is becoming a favorite resort of tourists during

the open season, from June 15 to October 1. See PARKS, NATIONAL.



GLACIERS, *glā'shurz*, icy masses of great bulk, resembling frozen torrents, which cover the summits and sides of mountains above the snow line. They are found in Switzerland, Scandinavia, the Andes, the Rocky Mountains in British Columbia, the United States and Alaska, and in the Himalayas. Glaciers have their origin in the higher valleys, where they are formed by the freezing and compression of masses of snow. The ice of glaciers differs from

that produced by the freezing of still water, as it is composed of thin layers filled with air bubbles. It is likewise more brittle and less transparent.

Characteristics. The glaciers are continually moving downward, and not infrequently they reach the borders of cultivation. A glacier moves from eighteen to twenty-four inches in twenty-four hours. At its lower end the glacier is generally very steep and inaccessible. In its middle course it shows an undulating surface, broken up by fissures, or *crevasses*. As it descends, it experiences a gradual diminution, from the action of the sun and rain and from the heat of the earth; hence a phenomenon universally attendant on glaciers—the issue of a stream of ice-cold turbid water from the lower end. The descent of glaciers is shown by changes in the position of masses of rock at their sides and on their surface. As glaciers move they pile up *moraines*, consisting of accumulations of stones and gravel, along their sides and at their lower ends. These are composed of fragments of rock detached by the action of frost and other causes (see *MORaine*.) The fissures or crevasses by which glaciers are traversed are sometimes more than 100 feet in depth, and since they are often covered with snow, they are exceedingly dangerous to travelers.

Famous Glaciers. One of the most famous glaciers of the Alps is the Mer de Glace, belonging to Mont Blanc, in the valley of Chamouni, about 5,700 feet above the level

of the sea. However, in the chain of Monte Rosa the phenomena of glaciers are exhibited in their greatest sublimity, and in their most interesting phases from a scientific point of view. Glaciers exist in all zones in which mountains rise above the snowline. Those of Norway are well known and also those of Iceland and Spitzbergen. Hooker and other travelers have given accounts of those of the Himalayas. Glaciers are conspicuous on the Andes, while the Southern Alps of New Zealand rival in this respect the Alpine regions of Switzerland.

The glaciers of Alaska are noted for their size and grandeur. They reach their greatest development along Glacier Bay and around Mount Fairweather, where, excepting those of polar regions, the largest glaciers of the world are found. Compared with these the glaciers of the Alps are mere rivulets. Among the most noted are the Malispena, on Yakutat Bay, 1,550 feet high, with an area of 600 square miles; the Valdez, in Prince William's Sound, fifteen miles long; the Muir, at the head of Glacier Bay, 200 feet high, with a frontage three miles long; and the Pacific Glacier, off Mount Fairweather. Extensive glaciers are also found around Cook's Inlet and along the Peninsula of Alaska. All of the valleys of the northern Alaskan coast are filled with ice rivers, and the fiords of this entire region have been formed by glacial action. In numerous instances the glaciers have plowed out gorges many feet below the level of the sea.

Why Glaciers Move. The downward movement of glaciers presents a problem to scientists. Though glacier ice is brittle, it descends in much the same way as a plastic substance, and like the parts of a river, its middle and upper parts move faster than the sides and bottom. One theory, called the *plastic* theory, supposes that ice is plastic to slow changes, though brittle under sharp, heavy blows. Therefore a huge glacier mass, forced downward by its own weight, can move at a very slow rate of speed without being smashed to fragments.

Prof. James Thomson of Glasgow has advanced the *pressure* and *regelation* theory. He showed that increase of pressure lowers the freezing point of ice, and pointed out that at any point where the pressure becomes greater than the average, the freezing point will be lowered and a little ice will

melt; with the release of pressure at this point the ice will move slightly, and the pressure will be changed to other points. Whenever there is melting the water will be forced through cracks in the ice to other points of less pressure, and will there freeze. As this process is repeated many times the ice mass moves slowly along.

Related Articles. Consult the following titles for additional information:

Geology	Mer De Glace
Glacial Period	Muir Glacier

GLADIATOR, *glad'i a tor*. In ancient Rome a person who fought in the arena for the entertainment of spectators. There was a time when the combatants were captives, criminals or slaves. At a later period gladiatorial fighting became a sport of the participants, and freemen fought in the arena for hire or for glory. Schools for the training of gladiators were founded, and even women are said to have entered the lists. The only weapon was a short dagger, and the only protection a small shield. The contests were usually between two men, between a man and a beast or between parties of men. If a gladiator were overpowered the audience by pointing thumbs up or down indicated whether he was to be spared or killed. The combats were brutal in the extreme, but appealed strongly to the Romans, who enjoyed nothing more than the sight of bloodshed. It is said that Emperor Trajan gave one gladiatorial exhibition which lasted a hundred days, during which 2,000 men were killed. Such exhibitions were abolished by Theodoric in A. D. 500.

GLADIOLUS, *glad'i o lus*, a stately plant of the iris family, extensively cultivated for its tall, crisp spikes of showy blossoms, which are crimson, yellow, variegated or white. The long leaves are ribbed and sword-shaped, and cling to the base of the flowering stalk. The gladiolus is grown from a bulb called a corm. To insure continuous seasonal blooming, the corms should be planted at intervals of two or three weeks in March, April and May. The blossoms are ranged on one side of the spike; the flowerets, formerly little larger than daffodils, have become, under cultivation, deep chalice, like an Easter lily, and half the size of that flower. The spray opens slowly, from below upward, and each day there are some fresh blossoms on the stem. The gladiolus fields on Long Island, N. Y., are among the most famous in the world.

GLADSTONE, *glad's tun*. WILLIAM EWART (1809-1898), England's greatest statesman during the reign of Queen Victoria, four times Prime Minister and a pioneer in the struggle for Irish Home Rule. He was born in Liverpool, of Scotch ancestry, and was educated at Eton College and at Christ Church, Oxford. Gladstone first entered Parliament in 1832, and at that time was a Tory, but later he found his sympathies turning to the Liberals, and it was as a Liberal statesman that he won fame and honor. Elected to Parliament in 1847 for Oxford University, he made his first great speech in an attack on Disraeli's budget of 1852. In the following year he became Chancellor of the Exchequer under the Earl of Aberdeen, a post which he also held for a short time in 1855 under Lord Palmerston. In 1859 he again took office as Chancellor of the Exchequer under Lord Palmerston.



The budgets which Gladstone brought forward during the six years that followed were



GLADIOLUS

remarkable documents. At the general election of 1865 he was returned for South Lancashire, and in the same year he became

the Liberal leader in the Commons in the Russell administration, still continuing to hold the post of Chancellor of the Exchequer. In 1867 a Reform Bill was brought forward, to the final shape of which Gladstone materially contributed. His advocacy of this measure shows his definite break with the Conservative party and his transition to the Liberals.

At the general election of 1868 Gladstone lost his seat for South Lancashire, but was returned by Greenwich. There being a great Liberal majority in the new Parliament, Gladstone became Premier. The next year he carried his bill for the disestablishment of the Irish Church, and in 1870 he passed his Irish Land Act. Parliament was dissolved in 1874, and the Conservatives succeeded to office. During Lord Beaconsfield's tenure of office, Gladstone denounced the Bulgarian atrocities, the Anglo-Turkish treaty and the Afghan War, and his speeches during his candidature for Midlothian greatly helped to render the government unpopular. In 1880 the general election reinstated him firmly in power. In 1882 two Irish reform acts were passed, and in 1883 measures relating to bankruptcy were carried. The bill extending household suffrage to the counties was next carried, but the Gladstone Ministry fell the following year.

In 1885 Salisbury resigned after an adverse vote in the Commons, and Gladstone again came into power. He soon startled the country by introducing a measure of Home Rule for Ireland (1886). As it failed to pass the Commons, an appeal was made to the country, the result of which was emphatically adverse to Gladstone's proposals, and he had to make way for Lord Salisbury. In 1892, however, the result was again reversed, and Gladstone once more resumed authority. He introduced another Home Rule bill, which was passed by the House of Commons, but rejected by the House of Lords. The aged Premier then retired to private life, but he had started movements that were to make England one of the most democratic countries in the world.

GLANCE, a name once applied to minerals with a lustre similar to that of metal. Some of the more important of these minerals are *glance coal*, which is *anthracite*, or hard coal; gold glance, which is gold or silver telluride; lead glance, or lead sulphide, and silver glance, or silver sulphide.

GLANDERS, *glan'ders*, a contagious disease afflicting horses, mules and asses and sometimes other domestic animals, though cattle, sheep and pigs are usually free from it. The disease is caused by a microbe and appears in different forms, though all animals afflicted with it usually present about the same characteristics. It is usually fatal, the animal dying in from eight days to three weeks. The chronic form, generally known as *farcy*, begins with the formation of little bunches or nodules under the skin, which terminate in ulcers. These ulcers occur usually on the neck and shoulders and inside the thighs. The disease affects the lungs and causes the nostrils to discharge a very offensive pus.

The spread of glanders is usually due to infection from the pus and other discharges of the afflicted animal. No remedy has been discovered, and when the disease appears the only means of preventing its spread is to kill the diseased animal and bury or burn the carcass, then thoroughly disinfect the stables and all articles with which the animal has been in contact.

GLANDS, organs whose specific function is to separate something from the blood. In structure a gland is a body of secreting cells, having a supporting basement membrane, a fine network of blood vessels, a nerve supply and a duct through which the secretion passes. *Simple tubular glands* are depressions of the mucous membrane, lined with secreting cells, as the glands of the stomach. Some bodies called glands have no duct, as the spleen and the thymus gland; the latter is situated in the front of the chest behind the sternum and partly in the lower part of the neck. It is largest in infants and gradually disappears in adult, or old, persons. It has been claimed that its function is the formation of colorless corpuscles. In hibernating animals it becomes enlarged and is laden with fat, as the time for the winter sleep approaches, and it may help to maintain the temperature and respiration of the body during the period of rest. The *thymus* of veal and lamb is called *neck sweetbread*, to distinguish it from the pancreas, or stomach sweetbread.

The *thyroid gland* lies in the throat below the larynx and when enlarged by disease gives rise to "Derbyshire neck," or goiter.

The *liver* is the largest gland of the body. In connection with the alimentary canal

there are in the mouth, the two *parotid*, two *submaxillary*, two *sublingual*, and many *buccal* glands, whose function is to secrete saliva. The parotids are situated one in front of each ear and are the seat of the disease known as *mumps*. *Sebaceous glands* are abundant in those parts of the surface of the body supplied with hair; they are also situated about the entrances to the body, the nose, mouth and ear. These glands are absent from the palms of the hand and soles of the feet, and pour out an oily secretion which keeps the hair and skin soft. *Sudoriferous*, or sweat, glands are situated in all parts of the surface of the body and are especially abundant in the palms of the hands and soles of the feet.

Related Articles. Consult the following titles for additional information:

Golter	Secretion
Liver	Skin
Pancreas	Spleen

GLAS'GOW, SCOTLAND, in 1931 the second city in size in the British Isles, being exceeded only by London. In 1917, owing to the military situation and munition manufacture, Glasgow forged rapidly ahead of Birmingham, its nearest rival. The city is the largest in Scotland, is situated on both banks of the River Clyde, and is famous for its age, its architectural beauty and its great university, founded in 1451. Population, 1931, 1,088,417.

The city is divided into east and west sections, the dividing line being Buchanan Street. In the east section is all that remains of the ancient Glasgow, around which has grown a portion of the modern city, particularly the public buildings section. The western part contains the modern and the more fashionable quarter. The main streets are for the most part parallel with the river, and cross streets are generally at right angles to these. This statement does not apply, however, to the oldest part of the town.

Argyle Street, the main business thoroughfare, parallels the river. George Square, the civic center, is adorned with a dozen fine statues, the most imposing being a great bronze figure of Sir Walter Scott, at the top of an 80-foot column. Around the square are a number of the most noted buildings, including the municipal building and the postoffice.

Glasgow is a vast manufacturing city, and it has the smoky skies of the average fac-

tory town; in other respects its attractions are manifold. Its manufacturing advantages are due to the location of the city not far from the mouth of the navigable Clyde, the possession of a fine harbor, and nearness to coal and iron fields. The river was widened and deepened at a cost of \$42,000,000. The exports are chiefly cotton, linen and woolen goods, coal, paper, machinery and chemicals. Whisky has also been a famous export, for Scotch whisky is known throughout the world. As a ship-building center Glasgow for many years has led the world. The water supply for the city is secured from Loch Katrine, about forty miles distant and 365 feet above sea level.

Government. Glasgow has set an example in municipal reform which has been followed in many respects by other cities throughout the world. The city controls all its activities; there are no private companies in control of public service utilities. This is true of many other municipalities, but Glasgow exercises its official rights more broadly than most other towns. For example, the private yards of the citizens, as well as streets and alleys, are cleaned by the city, at slight expense to the householder; the public lodging houses (not hotels) are owned by the city; there are family homes, city controlled, in which working mothers can live very cheaply and cleanly, and leave their children during the day; the city's garbage is worked into commodities which return a profit. The street cars have been municipally owned since 1894. There are municipal markets, and all slaughtering is done under city control.

Education. The University of Glasgow has been mentioned above, and particular reference is directed to the article GLASGOW, UNIVERSITY OF, following. There is also the Glasgow and West of Scotland Technical College, Anderson College, the United Free Church College, Saint Mungo's College and Saint Margaret's College for Women, in addition to the usual means for free public education.

History. The city's traditional beginning has been traced to the year A. D. 560, or thereabouts, when Saint Kentigern, called the "apostle to the Scots," built a little wooden church on its site. Afterwards there was no development which became historical for over five hundred years. In the year 1116 the Prince of Cumbria, later King

David I, built a new church on the site of the first building and took steps which made certain the permanence of the settlement.

In 1300 William Wallace (which see) defeated the English here, and in 1305 in Glasgow he was betrayed to them. In 1636 the town became a free royal burgh. The assured prosperity of the city began soon after the union of Scotland and England in 1707.

GLASGOW, UNIVERSITY OF, one of the most celebrated universities of Great Britain, founded at Glasgow in 1451. By acts of Parliament in 1858 and 1889, the university was thoroughly reorganized and now exists on very much the same plan as the universities of Oxford and Cambridge. The corporation consists of a chancellor and rector, dean of faculties, principal, professors and students. The chancellor is chosen for life. The rector is chosen by the students every three years. The university maintains departments in the arts, science, medicine and surgery, theology and law. The enrollment is about 2,800 in normal years, including many who receive fellowships and scholarships. About one-fourth of the students are women. The library contains 210,000 volumes, and the university has connected with it a number of important museums and exhibits.



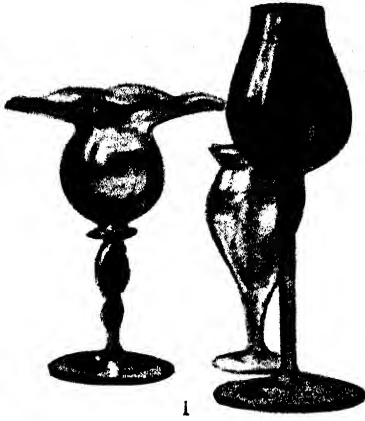
GLASS, a very useful transparent substance made by melting together under intense heat sand and various other ingredients. It would be difficult to conceive a civilized world without glass. It is the material used in making our window panes, a portion of our tableware, our medicine bottles, our mirrors and the lenses of our spectacles, and it is utilized constantly in the arts, in commerce, in science and in business.

Manufacture. Glass is made in factories especially constructed for the purpose. The most important part of the factory is the furnace. This may be circular, with a shelf running around next to the wall, or it may be rectangular, with the bottom sloping towards one end. In either case, the furnace is the base of a huge chimney. The fuel

used is gas, and the furnace must be supplied with a strong draft, in order to insure the intense heat necessary to melt the materials. These are placed in pots, when circular furnaces are used, and the pots rest upon the shelf around the wall of the furnace. These pots are made of fire clay and are very carefully constructed. Each holds from 1,500 to 2,000 pounds of material. For the best quality of glass the pot is hooded and has an opening on the side of the hood, through which the material can be put in and the melted glass taken out. For cheaper varieties the pots are open at the top. In the tank furnace, the type used most generally in modern glass making, the material is thrown into the tank, where, as fast as it melts, it runs down the sloping bottom to the lower end of the tank, from which it is taken out, while the raw material is put in at the opposite end. The largest furnaces are seventy-five feet long, sixteen feet wide and five feet deep.

The kind and quality of the product depend upon the substances used. For a good quality, all of the raw material must be pure. Sand forms the basis of all varieties and is the most difficult substance from which to separate the impurities. Animal and vegetable impurities, are removed by burning. Of mineral impurities, iron is the most objectionable, since it discolors the glass, and, except for the poorest qualities, makes the sand worthless. Sand used for colorless glass may not contain over one-half of one per cent of iron. Various other materials are added, according to the grade of glass desired and the purpose for which it is to be used. Lime is a common constituent, but it must be used with discrimination, as too much of it makes the glass brittle. Lead oxide is used in making varieties with a high degree of luster and transparency. Potash-lime glass is very hard and not easily melted. Other ingredients used include manganese, cobalt, copper, zinc, tin, arsenic and saltpeter besides pigments for coloring.

Preparation of Material. The ingredients are ground to a fine powder and thoroughly mixed in proper proportions, forming what is called the *batch*. To this a small quantity of broken glass, or *cullet*, is added to assist in melting. In pot furnaces it requires about twenty-four hours for the glass to melt and become clear. When this has been done the fire is lowered, and the glass is taken



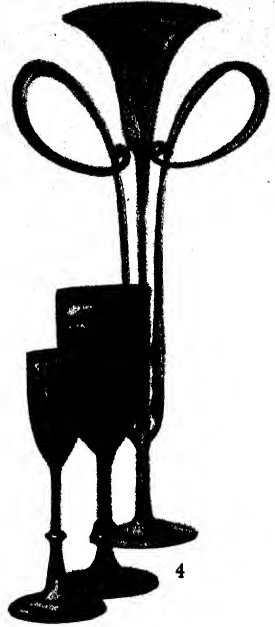
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11



10

ARTISTIC GLASSWARE

1, Modern Vases, London.

2, Phoenician Pitcher, ancient.

3, Goldglass Tumbler, eighteenth century.

5, Ruby Pitcher

6, Chinese Vase

7, Mohammedan Lamp, Egypt,

8, Spanish Glass

9, Venetian Flask.

10, Persian Bowl.

out and worked. In tank furnaces the material is constantly being added and the glass being withdrawn.

Methods Used. There are three general methods of shaping glass, blowing, pressing and casting. Bottles, window glass, vases and the most expensive tableware are blown. The glass blower uses only a few tools of the simplest patterns and depends almost entirely upon his skill to obtain the desired results. He gathers on the end of his blowpipe, which is a straight iron pipe about four feet long, a sufficient quantity of melted glass to make the article desired, then by blowing into this, rolling and swinging the pipe and using such tools as calipers and burnishers, he proceeds to fashion the object. In blowing window glass, the workmen stand upon a bridge over a trench, which is several feet deep, and they use larger and longer blowpipes than those used in making small articles. The workman gathers upon his blowpipe from twenty to twenty-five pounds of glass. By blowing into this and swinging his pipe, he causes this mass at first to take on a shape resembling a pear; then by holding his pipe upright and blowing into the glass and rotating the pipe, he changes the pear into the form of a cylinder. When the cylinder has been perfected its ends are cut off, and it is laid upon a table and scratched lengthwise with a diamond; it is then cut in two on the side by laying a cold iron over the mark. The open cylinder is placed in the flattening furnace, where, as it softens, a workman flattens it by pressing it down upon a table with a piece of charred wood attached to a long handle. This makes a pane of glass about forty-five inches long and thirty-six inches wide. During the World War American manufacturers experimented successfully with the automatic manufacture of window glass in a continuous sheet.

Kinds of Glass. Owing to the different substances used in its manufacture, the various proportions in which these may be combined, and the different methods of manufacture, there are many different varieties of glass.

Colored Glass. However strange it may seem to us, the glass made by the ancients was colored. Originally this coloring was probably due to the impurity of the materials used. Later it was discovered that different colors could be produced by mixing certain

Outline on Glass

I. USES OF GLASS

- (1) In the home
- (2) In industry and the arts
- (3) In science

II. MANUFACTURE

- (1) Types of furnace
- (2) Ingredients
- (3) Preparation of material
- (4) Methods

III. KINDS OF GLASS

- (1) Colored
- (2) Ornamental
- (3) Bottle glass
- (4) Pressed
- (5) Plate
- (6) Flint
- (7) Cut

IV. HISTORY

- (1) Ancient
- (2) Modern

Questions on Glass

What is glass?

How is window glass made? How cut? How flattened?

How are bottles made?

How is cut glass made? What makes it so expensive?

How is stained glass made?

When and where was glass first used for windows?

What fuel is used in the furnace in making glass?

Why should the raw materials be pure?

How is coloring in glass produced?

What are the leading countries in the manufacture of glass?

To what is due the softness and brilliancy of plate glass?

Why are glass factories most numerous in the gas belts of the country?

How many pounds of melted glass does the blower gather at the end of his pipe? How does he shape it?

How is lettering placed on bottles?

substances with those ordinarily used in the manufacture of glass, and all colored glass made at the present time is produced in this way, the oxides of metals being used for most of the colors. Every conceivable tint is now possible for makers to produce.

A pale yellow or pale green is produced by oxide of iron, and a pink, amethyst or violet by manganese. Copper produces deep blue or deep green, but a ruby-red color may be imparted by the addition of a reducing agent to take the oxygen from the oxide. Cobalt oxide gives a rich blue, tin oxide a milky white, and other beautiful tints result from combinations of various sorts.

Ornamental Ware. There are many methods of making ornamental glassware. Sometimes the glass is colored by dipping a transparent glass into colored glass when the latter is in a molten state. Figures worked into vases and other articles, as shown in Figs. 6, 7, 10 and 11 in the accompanying color plate, are usually made by working the colored glass into the glass forming the body of the object. This is usually done by placing the figures upon the outside of the vessel and then subjecting the glass to such heat as will partially fuse it. The figure then sinks into the body of the glass and blends with it. Other beautiful effects, such as are shown in Figs. 4 and 9, are produced by blending glasses of different colors, either in the manufacture of the article or in the material from which it is to be made. For the method of making colored glass windows, see article on STAINED GLASS.

Bottle Glass. See BOTTLE.

Pressed Glass. Much of the table ware and many other small articles are made by pressing the glass in molds. The mold is of iron or steel and contains any ornamental designs which the article is to take. A sufficient quantity of melted glass to make the article is dropped into the mold, and then a plunger, which forms the inside of the article, is forced down upon it. This presses the glass into every part of the mold and impresses upon it the desired design.

Plate Glass. Plate glass is made by casting on an iron table. The melted glass is poured onto the table, which has a steel rim rising above the surface to the height of the desired thickness of the glass. As the melted glass is poured, a heavy roller is passed over it, forming the plate. The peculiar softness and brilliancy of plate glass are due to the purity of the material used and the polishing which the glass receives.

Flint Glass. This is a variety in which potash and pure sand are used, making it particularly clear and transparent. It is used for the best articles of table ware and

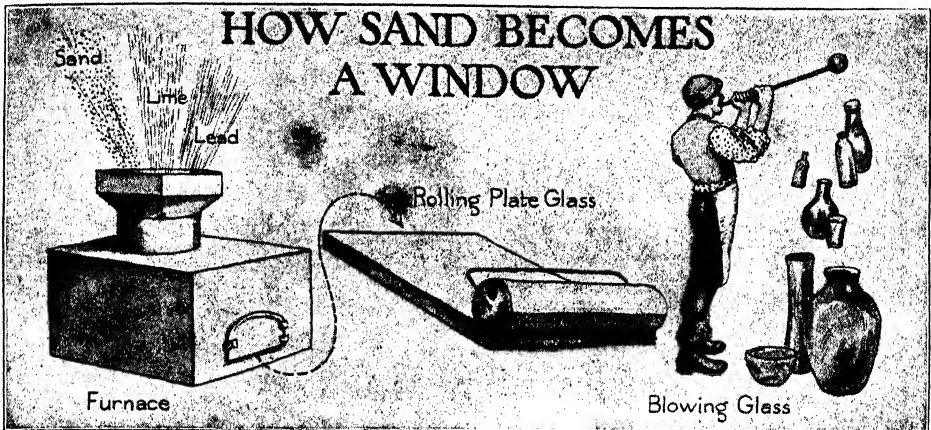
in the manufacture of small bottles, vases and other smaller articles.

Cut Glass. This is made by grinding the best quality of blown glass on wheels, over which flow streams of water and sand. This glass is prized for its brilliancy and is very expensive, as it requires the service of highly-trained workmen.

History. Glass has been in use for so many centuries that we do not know when it was first manufactured. Tombs of the ancient Egyptians which were built more than 3,000 years B. C. show glassblowers at work, and specimens of glass that were made more than 2,000 B. C. have been found in other tombs of these ancient people. The Chinese and other peoples of the East also became very skilful in the manufacture of glass before the Christian Era. Vases, pitchers and other ornamental vessels found among the ruins of the buried cities in Greece and in Asia Minor, show that the Greeks and other ancient peoples of this part of the world were well acquainted with the manufacture of glass. The earliest use of glass was for ornamental purposes, and all of the articles which have been discovered in the ruins of ancient cities are of colored glass. The use of glass for windows is of more recent origin. As far as known, it was first used for this purpose in England in the latter part of the seventh century, but its use was restricted to colored glass which appeared in cathedral windows.

Before the World War the United States imported yearly about \$8,000,000 worth of glass, and exported glass products having a value of about \$3,800,000. During the war American manufacturers vastly increased their equipment and output, and the United States became one of the great exporting countries. Special progress was made in the manufacture of optical glass, watch crystals, oven glass, photographic glass and laboratory and chemical ware, which previously had been largely furnished by Germany. At the close of the war it was announced that the phosgene gas manufactured for military purposes had powerful bleaching properties, and would be used in bleaching sand used in the manufacture of optical lenses.

GLASS SNAKE, a lizard of snakelike appearance, whose name refers to its habit of stiffening when frightened, and snapping off its tail. The creature is about twenty-seven inches long, and three-fourths of an inch in



What fairies have waved their magic wands to bring clear, transparent glass out of a mass of sand, lime, soda, lead, or other materials? Heat and Chemical Reaction are the spirits who perform these and countless other wonders. Under their touch these materials give up their own forms and characters and are lost, while in place of them appears a new and crystal pure substance. And think how, by the aid of glass, we can explore the world of the invisible! The good fairies we have named and many others out of the mysteryland of "Science" are Man's most faithful servants, and come and go and work as he directs. The tales of magic in which we revel as children do but foretell the real things that Man is having done for his benefit every day.



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The ladle has been brought from the furnace by an overhead trolley, and the glass is to be poured out on the casting table. As soon as it has spread over the table, the heavy steel roller will smooth it out, forming the plate that may become a window of "the largest department store in the world." When the plate becomes hard it is taken on a stone slab into a long, low tunnel, hot at one end and cold at the other, and it passes down this tunnel very slowly, cooling and annealing. Glass in the making must be handled like a baby.

A ladle of molten glass just drawn from a tank furnace. In this furnace a heat of 2600° F. is kept constantly, day and night, for months at a time, while raw materials are fed in regularly at one end and the molten glass is drawn off just as regularly at the other. By varying the kind or amount of the materials used, every possible sort of glass can be made; six inches or more thick, or as thin as the dragon fly's wing; as pure as the air, or with all the colors of the rainbow softly blended; in forms and designs and for uses innumerable.



© Underwood & Underwood



Photo from Keystone View Co., Inc.

After the grinding plate glass must be smoothed and polished to give the soft and brilliant surface which we know so well in the large windows of city stores. After all the work that has been put upon it, we do not wonder that plate glass is insured.

Plate glass must be ground carefully that it may be of even thickness and be without imperfection. On this steel table the plate is laid, then the table is run under the grinding machine. Glass is one of the hardest substances in common use, but we know it can be worn down by steady rubbing.

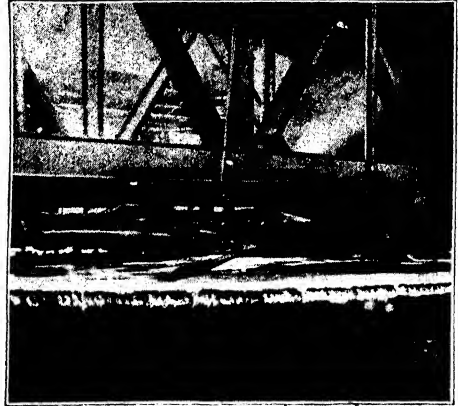


Photo from Keystone View Co., Inc.



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Common bottles are made in machines by blowing the molten material into moulds by compressed air. These bottles, if allowed to stand, would cool unevenly, from the outside first, and might fly into a thousand pieces. This boy stands ready to start them on their slow journey down the annealing tunnel.

Blowing glass is a most fascinating process. The skilled workman can produce any shape desired, from the big carboys that hold acids, to the fragile instruments of the laboratory. He may blow a long cylinder which later will be flattened out for ordinary window glass, or a string of delicate beads.



Photo from Keystone View Co., Inc.

diameter. Its skin is a shining olive, brown or black. The glass snake is found in many parts of the world.

GLAUBER'S, *glow'bers*, **SALT**, the common name for sodium sulphate, a white crystalline compound with a bitter, salty taste. When exposed to the air its crystals turn to a white powder. It was originally prepared by a seventeenth century chemist named Glauber, whose name was given to it. Glauber's salt is used as a purgative in medicine, chiefly in veterinary practice. It is also used in glass manufacture and in fixing lead mordants in dyeing and printing. This salt is found native in many localities, occurring in large colorless prisms. It is also a constituent of mineral waters, and it exists in small quantities in the blood.

GLAZING. See **POTTERY**.

GLENS FALLS, N. Y., in Warren County, sixty miles north of Albany, on the Hudson River and on the Delaware & Hudson and the Hudson Valley railroads. The falls in the river supply power for factories, the most important of which are lime and cement works, lumber mills and manufactories of paper, shirts, collars and other goods. A local insurance company has a fine business home, and there is a public library, a hospital, a state armory, an academy and two parks. Glens Falls was settled in 1763, Population, 1920, 16,591; in 1930, 18,531, a gain of 11.7 per cent.

GLOBE. In geography and astronomy, the word is applied specifically to an artificial sphere, made of metal, plaster, paper or pasteboard, on the surface of which is drawn a map or representation of either the earth or the heavens. The former is called the *terrestrial globe*, and the latter, the *celestial globe*. In the terrestrial globe the wire on which it turns represents the earth's axis, the extremities of it representing the poles. On the surface of the globe, as on other maps, are marked parallels of latitude and meridians. When the meridians are drawn through every 15° of the equator they are sometimes called the *hour circles*, since each two meridians mark points differing by one hour in time.

GLOBE, ARIZ., in Gila County, 575 miles east of Los Angeles, on the Southern Pacific Railroad. It is in a copper region, and also in a section where cattle raising is profitable. The great Roosevelt and Coolidge dams are near, as are also the Apache Trail and some

of the homes of the ancient Cliff Dwellers. The city has a Federal building, and there are a number of other new and pretentious buildings, particularly that of the archaeological society. There is a public library, and there are two hospitals. Population, 1930, 7,157.

GLOUCESTER, *glah'ster*, ENGLAND, the capital of Gloucestershire, is situated on the left bank of the Severn, thirty-three miles northeast of Bristol. The ancient Roman ground plan of the city is still seen in the four streets meeting at right angles in the center of the town, at what is called the *cross*. Remains of Roman walls are to be seen in many places. Among the buildings of interest are a deanery, the New Inn, the episcopal palace and the new guild hall. The nunnery, which existed as early as the seventh century, was supplanted by a monastery about 820, which was in turn followed by a great Benedictine Abbey. This abbey became the center for the cathedral, which was built from 1088 to 1498. Gloucester has engineering works, flour mills, iron foundries, shipbuilding yards and manufactories of chemicals, cutlery, agricultural implements and soap. The commerce is important, trade being facilitated by a canal leading from the estuary of the Severn to the city docks. Population, 1931, 52,937.

GLOUCESTER, MASS., in Essex County, thirty miles northeast of Boston, on Cape Ann, Massachusetts Bay, and on the Boston & Maine railroad. There is an excellent harbor, and the fisheries, which are the largest in the United States, include cod, herring, haddock, halibut and mackerel; over 5,000 men are engaged in the industry. There are also manufactories of clothing, refrigerators, and glue. There is a large summer tourist business. The first permanent settlement was made in 1633, and it was chartered as a town in 1642 and as a city in 1873. The importance of the town dates from the beginning of the eighteenth century. Population, 1920, 22,947; in 1930, 24,204, a gain of 5.4 per cent.

GLOVE, *gluv*, a covering for the hand, with a separate sheath for each finger. Gloves have been used since very ancient times and were probably known to the prehistoric cave-dwellers. The Greeks used them for protection; the Romans, for ornament. In the Middle Ages gloves came to have a symbolical significance. They were offered as gages in courts of law and in making a

challenge to a combat at arms. A leather glove was worn inside of metal armor to prevent chafing of the hand. In the fifteenth century gloves came into general uses in parts of Europe and in England.

Gloves are made of leather, fur, cotton, linen, silk and worsted. The chief leathers used in glove manufacture are buck, calfskin and sheepskin, for military gloves; lambskin, for most of the so-called kid gloves; real kid, for the best and finest gloves; dog, rat and kangaroo skins, for other grades. The leather in all cases undergoes a much lighter dressing than when used for boots and shoes. Leather gloves are usually cut out by means of dies and are sewed by machinery. The best woolen, thread and silk gloves are made by cutting and sewing, but cheaper grades are made by knitting and weaving. France supplies the world with most of the finer and more expensive gloves, but the United States leads in the manufacture of men's gloves, and the center of the industry is in Gloversville, Fulton County, N. Y. About four million dozen pairs of leather gloves and mittens are made in the United States each year.

GLOVERSVILLE, *gluv'urz vil*, N. Y., in Fulton County, fifty-four miles northwest of Albany, on the New York State Barge Canal and the New York Central railroad. It is the most extensive glove manufacturing center in America, producing, with its neighboring city of Johnstown, more than half the entire output of the United States; there are also three silk mills. There is a Federal building, a Carnegie Library, an Old Ladies' Home and thirty acres in parks and playgrounds. The place was settled at the beginning of the Revolution and was known as Stump City until 1832. It was chartered as a city in 1890. Population, 1920, 22,026; in 1930, 23,099.

GLOW WORM. See **FIREFLY**.

GLOXINIA, *gloks in'ia*, a dainty hot-house plant prized for its ornamental foliage and richly colored trumpet-shaped flowers, which terminate in several spreading lobes. It is a native of the tropics, but has long been successfully cultivated in northern greenhouses. The plant requires a light soil.

GLUCK, *gluk*, **ALMA** (1886-), a popular American dramatic soprano and concert singer. She was born in Bucharest and at the age of five emigrated with her parents to New York. From 1906 to 1909 she studied vocal music, but with no expectation of a

professional career. In the latter year she sang for the director of the Metropolitan Opera House, who offered her an engagement. Except for a year in Berlin as a student of Madam Sembrich, she has since been singing in opera and in concert almost continuously. In 1914 she married the Russian violinist, Efrem Zimbalist.

GLUCK, **CHRISTOPH WILLIBALD** (1714-1787), the first German composer to attempt to reform the opera, and the father of modern music-drama. He was born in Bavaria, and was largely self-taught. In his first opera *Artaxerxes*, written in 1740 for the court theater of Milan, he departed from the old school which conceived opera as a mere concert in costume. Coming under Handel's influence, he developed a lyric power which created a new order of musical composition. His first great opera *Orpheus and Euridice*, was given its first public performance in 1762, and *Alceste* was produced four years later. Whereas in earlier operas any unpalatable plot was considered good enough as a basis for opera, and any rhyming stanza, however stupid its content, was thought a suitable peg on which to hang a song, in the opera of Gluck the libretto was true poetry, and the music expressed, or rather intensified, the emotion or thought the words conveyed. Gluck composed fifty-four dramatic works, the best of which is *Iphigenia in Tauris*.



GLOXINIA

Other notable works were *Iphigenia in Aulis*, *Paris and Helen* and *Antigone*.

GLUCOSE, a syrup manufactured from the starch of corn. The corn is soaked for

two or three days in water containing a small quantity of sulphurous acid, then ground into a coarse meal and treated with a mixture of starch and water. This causes the germs to float to the surface, while the heavier portion, containing the starch, settles. The germs are skimmed off and used in making corn oil. The starch is separated from other parts of the crushed corn by washing. Glucose is made from the starch by treating it with water and hydrochloric acid in steam-heated, closed vessels, called *converters*; sulphuric acid is used for some grades. The process requires from ten to thirty minutes, according to the grade of glucose required. When the liquid leaves the converter, the acid is removed by chalk or marble, if it is sulphuric, or by soda, if hydrochloric. The glucose is then filtered and boiled until the desired consistency is secured.

Glucose is considered a healthful food and is used for canning fruits and in making jellies and confectionery. It has been accepted by many people as a very satisfactory substitute for sugar in candy-making. The manufacture of glucose has become an important industry in the United States, and the country now exports many million dollars' worth each year to world-wide consumers. See CORN.

GLUE, an animal cement, made from the parings of hoofs and from the hides, tails and bones of animals; the best glue is obtained from the true skin. The parts are first thoroughly cleaned by soaking them in lime water, which process requires at least ten days; then they are boiled in soft water for several hours, until the glue is extracted. The liquid is then drawn off and allowed to cool. As the glue becomes solid it is cut into cakes, which are cut by wires into thin sheets. These are again cut into pieces about four inches square, then thoroughly dried and packed for shipment. White glue is bleached, but common glue is of a dark brownish color. Fish glue is made from the heads, offal and scales of fish. Glue is used for sticking pieces of wood together; in making ink rollers for printing presses; in thin solutions, for sizing paper and cloth; in calico printing, and in kalsomining. Peter Cooper, in 1837, made the first American glue. See GELATIN.

GLUTEN, *gloo'ten*, a tough, elastic substance of a grayish color found in the flour of wheat and other grains. A similar sub-

stance is found in the juices of certain plants. The gluten in wheat has a high degree of tenacity and imparts to bread dough that toughness and stickiness which enables it to hold the gas bubbles created by yeast. Light, porous bread is the result. For this reason wheat flour is the most popular brand for bread. There are, on an average, eight pounds of gluten to one hundred pounds of flour.

GLUTTON, the English name for the European flesh-eating animal which is known in the United States as the *wolverine*. The animal is slow, but persevering, cunning, fierce and of great strength, and is famous for its voracious appetite for putrid flesh. The fur, which is shaggy and dark brown, is valuable, that from Siberia being preferred because of its glossiness.

GLYCERINE, *glis'urin*, a transparent, colorless liquid, obtained from the by-products of candle and soap factories, or made directly by decomposing fats with steam under pressure or with lime. It is as thick as syrup, has a sweetish taste and at a low temperature crystallizes into a solid mass. It absorbs moisture from the air and dissolves in, or mixes with, water and alcohol in all proportions, but it is insoluble in ether. It acts as a solvent on both inorganic and organic bodies. The uses of glycerine are very numerous. In the arts it is used wherever a substance requires to be kept moist. It is also used in the preparation of tobacco, as an ingredient of inks and oils, in making cosmetics, toilet soap and printers' ink rolls, and in spinning, weaving, rope making and tanning. It is an excellent preservative medium for meat and for natural history specimens; and its property of lowering the freezing point of water makes it useful in gas meters, floating compasses and similar instruments. It is also extensively employed in the manufacture of nitroglycerine (which see).

GLYN, *glin*, ELINOR, an English novelist who became widely known in 1907 through the publication of a sensational book entitled *Three Weeks*. It awakened more discussion than it deserved from a literary standpoint, and was dramatized successfully. Several other books of the same type followed, including *The Reason Why*, *His Hour*, *The Sequence* and *The Career of Katherine Bush*. Though Mrs. Glyn's books are popular with those who enjoy sensation, they

have no distinction of style or subject matter, and their moral tone is low. The author is the daughter of Douglas Sutherland, of Toronto, Canada. In 1892 she married an Englishman, Clayton Glyn. Her permanent residence is in France.

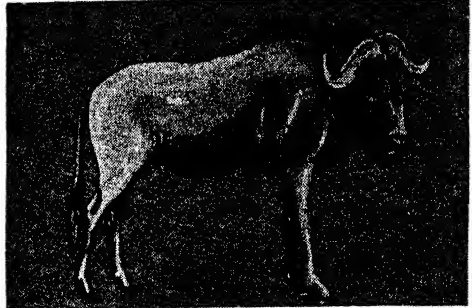
GNAT, *nat*, a general term applied to a number of different insects, of which the most common is the mosquito. Some species are so minute as to be almost invisible, and as the stings they inflict are highly annoying and irritating and the insects appear sometimes in countless thousands, they render life almost intolerable in some localities. See MOSQUITO; HESSIAN FLY.

GNEISS, *nise*, a rock of almost the same composition as granite, but having a layer formation. Quartz, feldspar and mica predominate in it, and there are numerous accessory minerals. The layers, whether straight or curved, are frequently thick, but often they vary considerably in the same specimen. Gneiss is rich in metallic ores, such as gold, silver, cobalt, antimony, copper and iron, but it contains no fossil remains. Porphyritic gneiss presents large, distinct crystals of feldspar, which traverse several of the layers. Gneiss often contains hornblende, in place of mica, and then receives the name of syenitic gneiss. It is the principal rock of some regions; it predominates in Norway and Northern Europe, and abounds in the Southern Alps and the Pyrenees and forms the loftiest chains of the Andes near Quito. In the United States, gneiss is a common rock, especially in New England and the eastern and southern parts of New York. See GRANITE; MICA.

GNOMES, *nomes*, in folklore, a name given to fairies who were supposed to guard the veins of precious metals in the earth. They are usually pictured as bearded dwarfs, clad in close-fitting brown garments and hoods. They served as smiths for the gods, and mined gold, silver and precious stones. They were condemned to live underground all their lives; if they appeared in daylight they were turned to stone. See FAIRIES.

GNU, *nu*, the name given to two quite remarkable species of South African animals which appear to be part antelope, part buffalo and part horse. The gnu of either sex has horns projecting slightly outward and downward, then bending abruptly upward, so that the head looks like a buffalo's. It has bristly black hair about the face and

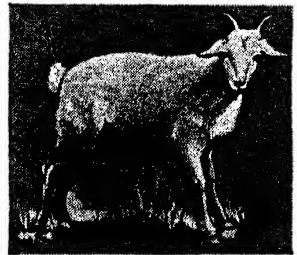
muzzle, a white, stiff mane and horselike tail. The animal is about nine feet long and stands about four feet high at the shoulder. Gnus live in herds and are said to be fierce when attacked, but when taken young



GNU

they have been found capable of domestication. When alarmed, either species will wheel in a circle once or twice before running away.

GOAT, in some parts of the world one of the most valuable of animals, providing good milk and flesh for food and skins and hair for clothing. In North America and Great Britain there is a prejudice against goat's milk, but it is sweet and nourishing, and justifies the term, "the poor man's cow," which is applied to the animal. However, there is increasing realization of the value of the milk of goats for invalids and undernourished children. In some sections of the United States, herds of milk goats are maintained near populous communities for the purpose of securing a constant supply of their milk.



GOAT

According to the United States census reports, there are nearly 5,000,000 goats and kids on farms and ranches of the country.

Goats are easy to keep, for they can live on food which other animals refuse to eat; they like the branches and leaves of shrubby plants, and they graze as do sheep. Some people do the goat an injustice when they include tin cans in its diet, but the statement emphasizes the wide range of its food.

The goat belongs to the sheep family. It has hollow, erect horns, curved backward, and the male is bearded. While about the size of sheep, goats are not timid; they use their heads and horns for attacking enemies, and they are stronger and more agile than sheep. They are often kept as pets, and children harness and drive them. The skin makes the finest varieties of leather, and for leather manufacture the United States imports \$25,000,000 worth of skins every year.

The Angora goat is the aristocrat of the family. Its hair is white, fine and silky, and curls in ringlets from ten to fifteen inches in length. The Angora fleece is called mohair (which see).

GOAT'SUCKER, or **NIGHT'JAR**, a European bird, remarkable for its very flat head and wide mouth. It has large eyes and speckled feathers. It spends the winter in Africa and crosses the Mediterranean late in the spring. It passes the day in slumber and at twilight begins to hunt its prey—moths, cockchafers, and the like. The name arose from the old absurd belief that the bird milks goats. The strange leaping movements of these birds near the ground, their large mouths and their manner of seeking their prey near the ground and in pastures where domestic animals graze may have given rise to the notion. The bird makes no nest, but lays its eggs on the sand or in the grass. It is related to the American night-hawk and whip-poor-will.

Gobi, *go'be*, an immense tract of desert country, occupying nearly the center of the high tableland of Eastern Asia, and extending over a large portion of Mongolia and Chinese Turkestan. Its length is probably about 1,800 miles, its mean breadth between 350 and 400 miles, and its area 300,000 square miles. Its general elevation is over 4,000 feet above sea level. The East Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels, horses and sheep. This tract is supposed at one time to have been a great inland sea.

Much attention has been directed toward the Gobi Desert within recent years through exploration conducted by Roy Chapman Andrews in the interests of the American Museum of Natural History. Great eggs of the long-extinct dinosaurs have been found, and evidence has been uncovered of the ex-

istence here of a prehistoric race of men to whom the name dune-dwellers has been given. Most of the desert is easily traversed by motor cars and trucks during the summer months, and there are several caravan routes across it.

GOD, a term applied to the Supreme Being who is conceived to be the creator and ruler of the universe. When the word is spelled with a small *g* it refers to one of the numerous deities which figure in the religions of primitive peoples of to-day or to one of the superhuman beings of ancient mythology (see **MYTHOLOGY**). The Hebrews were the only ancient people who conceived of a world governed by one God, but originally Jehovah was to them a tribal God who cared only for the Israelites; they did not think of him as the Father of all the human race. The present conception of a God who loves all peoples alike has developed from Christianity, for Christ taught very clearly the idea of the universal Fatherhood of God.

The existence of God is not, however, universally acknowledged. There are those who deny that such a Being exists, arguing that no concrete proof can be given for belief in His existence. Such persons are called *atheists*. Another group, composed of those who argue that one can neither prove nor disprove the existence of God, are known as *agnostics*. The arguments of believers are in the main as follows: the fact that the whole universe and all parts of it are governed by natural laws proves that a supreme mind is back of everything; the presence in man of a moral nature shows that there must be a higher moral force; in nature all forms of life are adapted to their environment, and this design in nature proves the existence of God. Belief in the supernatural seems to be an almost universal instinct of the human race, and it is undoubtedly true that the majority do not require a concrete, tangible proof upon which to base such belief. See **AGNOSTICISM**; **ATHEISM**.

GODFREY DE BOUILLON, *de boo yoN'*, (about 1058-1100), duke of Lower Lorraine and one of the leaders of the First Crusade. When Jerusalem was conquered and a Christian state founded, Godfrey became ruler, with the title Baron. At Ascalon with twenty thousand men he defeated the sultan of Egypt with four hundred thousand, and he then devoted himself to the organization of his government and drew up for his courts of justice

code of laws which was a complete embodiment of feudal jurisprudence. He was buried at Mount Calvary.

GODIVA, LADY, the heroine of a well-known English legend. She was the wife of Earl Leofric, Lord of Coventry, a merciless aron of the eleventh century. When he heavily taxed the people of the town she egged him to lighten their burdens. The Earl promised that he would do so if she would ride naked through the principal streets. Lady Godiva, not dismayed by this condition, sent out a proclamation asking all the people to remain at home on a certain day, and not even to look out of their houses. On the appointed day she mounted a white horse and rode through the streets, her naked body covered only by her long hair. Only one man, a tailor, allowed his curiosity to get the better of him, but when he peeped at her through a hole in his shutter he was struck blind. The "Peeping Tom" tradition is probably based on this episode of the legend. For many years it was customary to celebrate the legend at an annual fair.

GOD SAVE THE KING, the national anthem of Great Britain, probably written in 1743, after the victory of George II over the French at Dettingen. It is claimed that Henry Carey was the author of both words and music, but there is evidence that the hymn was adapted from a much older tune. The same music has been used for a national air in Germany and one in Russia, while in the United States one of the most popular of patriotic songs, *My Country, 'Tis of Thee*, is sung to it.

The three stanzas of the anthem are given below:

God save our gracious King.

Long live our noble King,

God save the King!

Send him victorious,

Happy and glorious,

Long to reign over us:

God save the King!

O Lord our God, arise!

Scatter his enemies,

And make them fall!

Confound their politics;

Frustrate their knavish tricks;

On Thee our hopes we fix:

God save the King!

Thy choicest gifts in store

On him be pleased to pour;

Long may he reign,

May he defend our laws,

And ever give us cause

To sing with heart and voice:

God save the King!

GOETHALS, *gö'thals*, **GEORGE WASHINGTON** (1858-1928), an American soldier and engineer, and renowned constructor of the Panama Canal, was born in Brooklyn, New York. He was graduated from the United States Military Academy at West Point in 1880, was immediately appointed second lieutenant of engineers, and by 1909 had attained the rank of colonel in the engineer corps. He was chief of engineers during the Spanish-American War, and after February, 1907, was in complete charge of all work on the Panama Canal, which his engineering skill and administrative ability successfully hastened to completion. In 1914 he was made first governor of the Canal Zone, and in 1915 was raised to the rank of major-general by special act of Congress.

In 1915 Goethals was appointed chairman of a committee to investigate the effects of the Adamson Railroad Law, by which hours of labor and wages were radically changed. Upon completion of that task he was released by the government to construct good roads throughout New Jersey, but was recalled to supervise the construction of a vast merchant marine for the United States after the nation entered the war against Germany. Disagreement with his associates led to his retirement from the post, after which he became acting quartermaster-general of the American army. In March, 1919, he returned to civil life as a retired officer of the army, and the following month he went to Europe as a representative of an engineering firm to engage in reconstruction work.

GOETHE, *gö'té*, **JOHANN WOLFGANG VON** (1749-1832), the greatest figure in German literature, a dramatist, lyric poet, novelist and philosopher. He is to Germany what Shakespeare is to England and Dante is to Italy. Goethe was born at Frankfort-on-the-Main, August 28, 1749, the son of a man of wealth, education and position. At an early age the boy learned the French language, and a French theatrical company, performing at Frankfort, awakened his taste for the stage. Drawing, music, natural science, the elements of jurisprudence and the languages occupied him until, in 1765, after the breaking off of a youthful love affair, he was sent to the University of Leipzig to prepare himself for the legal profession. An illness forced him to return home, and when he resumed his law studies it was at the University of Strassburg, where, in 1771, he

took his degree of Doctor of Jurisprudence. At Strassburg he became acquainted with Herder—a decisive circumstance in his life, as Herder helped him to free himself from the restraints of French classicism and inspired his mind with views of poetry more congenial to his character than any which he had hitherto conceived.

After taking his degree he went to Wetzlar to practice law. While there he fell in love with a young lady who was betrothed to a friend of his, and in consequence he soon left Wetzlar. This was the experience which formed the basis of his *Sorrows of Werther*. The attention of the public was first forcibly attracted to him by his drama *Götz von Berlichingen*, which appeared in 1773, and in the following year he became world-famous on the publication of *The Sorrows of Werther*.

Not long after the publication of this work, Charles Augustus, the hereditary Duke of Saxe-Weimar, made the acquaintance of Goethe, and when he took the government into his own hands, he invited Goethe to his court. Goethe accepted the invitation, and late in 1775 he arrived at Weimar. Wieland was already there, having been the duke's tutor; Herder was added to the band in 1776; Schiller was afterward one of its members for a few years; and other poets, critics and novelists were gathered round these chiefs. Goethe was the leading spirit of the group even during the last quarter of the eighteenth century, when these men and others were constructing and guiding the literature of all Germany; and his supremacy became yet more absolute afterward, when for another generation he stood alone. In 1786 he set out on a journey to Italy, where he remained two years. This residence in Italy had the effect of developing still further his artistic powers. Here his *Iphigenie* was matured, *Egmont* was finished and *Tasso* was projected.

In 1790 was published the earliest form of the first part of *Faust*, which belongs rather to Goethe's whole life than to any particular period of it. At the time that Goethe was engaged in the production of these works he had been pursuing various other studies of a scientific nature with ardent interest. The result of his studies in botany was a work in which he gives expression to the view that the whole plant and all its different parts may be regarded as variously modified

leaves. In the following year (1791) he began to apply himself to optics, and he published a work on this subject also. In 1791 he became director of the court theater at Weimar, and his work here, with the production of *Wilhelm Meister*, occupied him until 1792, when he followed Charles Augustus during the campaign of the Prussians against the revolutionary party in France. In 1794–1796 Goethe published *Wilhelm Meister's Apprenticeship*, a novel which has become well known to English readers through the translation of Carlyle and which contains some of the most beautiful songs ever written. His next work of importance was *Hermann und Dorothea* (1797), a narrative poem in hexameter verse, the characters of which are taken from humble life. In 1806 Goethe married Christiane Vulpius, with whom he had lived since 1788 and of whom he always spoke with warmth and affection. In 1809 was published *Elective Affinities*, another novel, and between 1811 and 1814 appeared his autobiography, one of the finest autobiographies in any language. The *Westöstlicher Divan*, a remarkable collection of Oriental songs and poems, appeared in 1819. Goethe's last work was the second part of *Faust*, completed in 1831.

GOGH, VINCENT VAN (1853–1890), a Dutch painter whose art reached maturity in the Post-Impressionistic movement in France. He was born in a village of Brabant, Holland. After working in The Hague, London and Paris as a salesman for an art firm, he took up the study of painting, at first in The Hague and later in Antwerp. In the paintings of this early period he used dull brown tones and depicted the harsh ugliness of everyday life, but after a visit to Paris, in 1886, he completely changed his technique. Contact with the French Impressionists awakened in him an intense love of color, and in this mood are his landscapes of Southern France, pictures of still life and figure studies. For a time he was associated at Arles with a fellow artist, Gauguin. Van Gogh suffered from intermittent insanity, and died a suicide.

GOITER, or **GOITRE**, a disease which is marked by the swelling of the thyroid gland, situated in the front of the throat. It affects women more frequently than men, and seems to be most common in localities where there are lime formations that affect drinking water. The carrying of heavy weights is

known to be one cause of goiter, and others include inheritance, nervous shock and worry. Removal of the growth by a surgical operation is advisable in some cases; electric treatment and applications of iodine are also helpful. Each case should be treated as recommended by a reliable physician.

GOLCONDA, *gol kon'dah*, an ancient city of India, which was situated midway between Madras and Bombay. The ruins include the burial places of the ancient sovereigns of the kingdom of Golconda, and an ancient fortress, which is now used as a state prison. Golconda was famous for diamonds, which, however, were probably found in the territory to the south of the city, and were merely cut and polished at Golconda. The industry perhaps gave rise to the proverbial expression, "richer than Golconda."



GOLD, the most precious of metals, the one most sought in all regions of the earth from the earliest times, and because of its desirability and worth the standard by which all values have been measured. Proof of the extraordinary place it held among peoples of the most ancient times is abundant. Egyptians and Assyrians fashioned wonderful ornaments from it. The Hebrews put their faith in gold, but the Psalmist, employing a comparison that

touched them vitally, warned them of things that were "more to be desired than gold, yea, than much fine gold." Exploration of new lands, particularly America, was hastened by Spanish dreams of an "El Dorado," a region of fabulous golden wealth. Men who followed them have never ceased to search for the precious metal.

Gold is everywhere a synonym for opulence. Its possession carries benefits, yet its influence is often corrupt. Some men worship it, fight for it, die trying to accumulate it. Shelley, in *Queen Mab*, says:

Commerce has set the mark of selfishness,
The signet of its all-enslaving power
Upon a shining ore, and called it gold;
Before whose image bow the vulgar great,
The vainly rich, the miserable proud,

The mob of peasants, nobles, priests, and kings,

And with blind feelings reverence the power
That grinds them to the dust of misery.
But in the temple of their hireling hearts
Gold is a living god, and rules in scorn
All earthly things but virtue.

This most important metal is one of the heaviest of all known substances, being 19.3 times heavier than water. It is bright yellow in color, and is the most ductile and malleable of all metals. It may be beaten into leaves so exceedingly thin that one grain in weight will cover 56 square inches, and it will take 280,000 such leaves to make an inch in thickness. A single grain may be drawn into a wire 500 feet long, and an ounce of gold can be made to cover a tiny silver wire more than 1,300 miles in length. It may also be melted and remelted with scarcely any diminution of its quantity, yet it does not melt until heated to a temperature of 1945° F. It is soluble in nitro-muriatic acid, or *aqua regia*, and in a solution of chlorine, but it does not tarnish on exposure to the air.

The fineness of gold is estimated by carats, pure gold being twenty-four carats fine. Jeweler's gold is usually a mixture of gold and copper in the proportion of three-fourths of pure gold to one-fourth of copper; such a mixture is said to be eighteen carats fine. Gold ornaments only ten carats fine will not tarnish, and will wear better than those more nearly pure gold. Gold is seldom used for any purpose in a state of perfect purity, on account of its softness, but is combined with some other metal to render it harder. Standard gold, or the alloy used for the gold coinage, consists of 21.6 parts of gold and 2.4 of copper and is therefore called twenty-two carats fine. (actually 21.6).

Gold has been found in nearly all parts of the world. It is commonly found in reefs, or veins, amid quartz, and in sand and gravel; it is separated, in the former case, by quarrying, crushing, washing and treatment with mercury. The rock is crushed by machinery and then treated with mercury, which dissolves the gold, forming a liquid amalgam. The mercury is then distilled, and the gold is left behind. According to another method the crushed ore is fused with metallic lead, which dissolves out the gold, the lead being afterward separated by placing the alloy in a porous cup and heating. The lead melts at a lower temperature than the gold and is absorbed by the cup, leaving the gold free. This

process is called *cupellation*. Gold is extracted from sand and gravel by washing, and is obtained in the form of dust, grains and nuggets.

Production. It was lust for gold that motivated early Spanish adventures in the two Americas. They found it abundantly in Peru and Bolivia, and carried vast fortunes in the yellow metal back to enrich the homeland; other South American areas made lesser contribution. In Europe prior to 1890 the chief home source was the Ural Mountains region of Russia. When the metal was discovered in California in 1848 the United States soon took world lead in production, and held it for about seventy years, when the Transvaal, in the Union of South Africa, forged ahead and now holds first place among gold-producing countries, with a yearly output that is more than half of the world's production. The supply there appears unlimited.

There have been several "gold rushes" in North America, occasioned by the finding of rich deposits. Next in importance to the discovery in California was that in the Klondike, in The Yukon, in 1896. The yield there reached a total of more than \$25,000,000 before the field became much less profitable. The Porcupine field in Northern Ontario, is a producing area of note; now Canada is second to the United States in output in America, but the two together are below the Transvaal.

In the United States, California has been the leading producer since 1849, but for first honors Colorado is quite often a close rival. Alaska follows these, then other gold centers are Nevada, South Dakota, Arizona, Utah, and Montana. Other states produce the metal in lesser quantities.

Related Articles. Consult the following titles for additional information:

Ductility	Gold Beating	Malleability
El Dorado	Klondike	Metals

GOLD BEATING, the art or process of producing the extremely thin leaves of gold used in gilding. The gold which is beaten into leaf is almost pure metal, which has been melted at a greater temperature than fusibility requires. This extra heat gives the gold a greater malleability. It is cast into bars or flat ingots and sent to the gold beater in that form. The workman rolls it into a long, thin ribbon about $2\frac{1}{2}$ inches wide and then cuts the ribbon into squares. These squares are placed between sheets of peculiar

paper, known as "French" paper. It looks like exceedingly close-grained oil paper, and each sheet is about five inches square. Three hundred sheets are piled on one another, and a square of gold is laid on the paper between each two sheets. This forms a book, or, as the gold beaters call it, a *cutch*.

The gold beater slips bands of parchment over the cutch, binding all the leaves with the gold squares between them into a solid block. The cutch is laid on a block of stone, which has been faced up square, and with a twenty-pound cast-iron hammer the gold beater begins to flatten out the gold. The hammer falls on the center of the cutch for a time, thus driving the gold out. The cutch is beaten until the gold has expanded to the size of the sheets of French paper. Each sheet of gold is then removed and cut into four squares, so that each sheet is evenly squared. The leaves of gold are cut with a *filling wagon*, which consists of two pieces of sharp-edged reed or bamboo, set in a frame so that the parallel cutting edges will divide the leaf into the proper size in one cut. The leaf is cut on a soft piece of leather, so that steel knives cannot be used. The leaf is handled with pincers made of boxwood. The quartered sheets are laid in the *shoder*, which is like the cutch, except that the leaves are gold beaters' skin. About 1,000 of the gold squares are placed in the shoder, and this pile is beaten with a twelve-pound hammer for an hour. Again the leaves are cut into quarters and placed in the *mold*, which, like the shoder, is made up of gold beaters' skin, and the hammer pounds it for nearly seven hours, until the gold is spread out to the size of the mold. The leaves are then ready to be cut into squares $3\frac{1}{8}$ inches on a side and laid in books, 25 leaves to each book, 20 books to a pack, so that a pack contains 500 sheets of gold leaf.

Dentists use gold leaf for filling teeth because gold will weld into a solid mass when cold. The dentist's gold leaf is not put through the shoder and mold, but is taken from the cutch, as they use a heavier leaf than gilders, bookbinders and sign painters.

Silver and aluminum leaf are also important products and are made in the same way. Archaeologists have found gold leaf on jars and other household utensils that were made 2,000 years before the time of Christ.

GOLD COAST, a British crown colony in West Africa, extending along the Guinea

coast for 334 miles and stretching inland to an average distance of 250 miles, having an area of about 80,000 square miles. The chief forts and settlements are Cape Coast Castle, Elmina, Accra (the capital), Axim, Saltpond and Winneba. The soil is exceedingly fertile, but the climate is unhealthful. The chief products are gold, palm oil, ivory, copal and caoutchouc. Population in 1931, 2,030,000. Of this number, about 3,000 were Europeans.

GOLDEN AGE, the legendary period in the history of almost all races, supposed to have been a time of enjoyment and prosperity, when the earth brought forth abundantly all things necessary for comfort, and men lived together in perfect harmony. The golden age of bygone ages was always somewhere in the more remote past; it is a significant sign of the present times that men are putting the "golden age" in the future.

GOLDEN BULL, the name given to the decree issued by Emperor Charles IV in 1356, to regulate the manner of electing emperors and the number and rights of the electors. The number of electors was fixed at seven—the archbishops of Mainz, Cologne and Trèves, the king of Bohemia, the count palatine of the Rhine, the Duke of Saxony and the margrave of Brandenburg. It was provided that in case of an interregnum the administration of the Empire should lie with the elector palatine and the elector of Saxony. The vital question as to what part the pope should have in the affairs of the Empire was left untouched.

GOLDEN FLEECE, in classical mythology, the fleece of gold in quest of which Jason made the Argonautic expedition to Colchis. See ARGONAUTS; JASON.

GOLDEN GATE, THE, a channel which connects San Francisco Bay with the Pacific Ocean. It is one mile wide and four miles long and is of sufficient depth for ocean steamers. It is now spanned by a great suspension bridge. Drake is said to have named this channel about 1578, but J. C. Fremont in his *Memoirs* claims that he suggested the name. See SAN FRANCISCO.

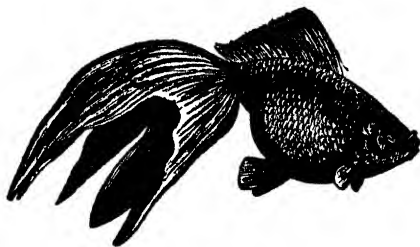
GOLDEN HORN, a long, riverlike harbor, famed in history and story, on which is located the city of Constantinople (which see). It is an arm of the Bosphorus, which joins the Black Sea and the Sea of Marmora. The Golden Horn is six miles in length, and has a maximum width of half a mile: 1,200

large vessels can ride at anchor within it at one time. This harbor is one of the most beautiful in the world.

GOLD'ENROD, the national flower of the United States, by common acceptance, and of at least six of the states. It belongs to the largest of all botanical families—the composite; the goldenrod group itself contains scores of species, eighty of which are found in the United States. One species follows another, and in regions where the flower is common, the fields, roadsides and hilltops are yellow with the hardy blossoms from early August until late autumn. The small golden flowers are borne in thick clusters on a slender stem, and the leaves may be feather-veined or three-ribbed. Goldenrods nearly always grow wild, as they do not take kindly to cultivation. Some species are utilized as forage plants, and the goldenrod of Canada yields a strong fiber, which, however, is not of commercial value. See COMPOSITE FAMILY; FLOWERS, NATIONAL, STATE.

GOLD'FINCH, a favorite cage bird in Europe, much loved because of its song and its fondness for those who tend it. It is a beautifully colored finch, in which red, yellow, black and white are mingled. It has been introduced into the United States, and large numbers of the birds live in the eastern sections of the country.

GOLD'FISH, a beautiful species of carp, found originally in the fresh waters of China, and now kept in aquariums. The yellow hue of these pretty creatures is the



FANTAIL GOLDFISH

result of careful selection and breeding, as members of the original stock were greenish in color. By careful breeding of a few fish, having golden tints, the present race was developed. The Chinese have made the propagation of goldfish an art, and in China many curious specimens have been produced. They are not difficult to care for; under good conditions they may be kept for years. The water should not be too cold and should have

a fresh addition every day. Prepared food may be purchased at stores which sell these fish.

GOLD LACE, a fabric woven of gilded threads, used as trimming for stage garments, for designs on uniforms and liveries, and for adorning altar cloths, clerical robes, banners, etc. Gold lace thread is made in the following manner: A rod of silver is covered with gold leaf and drawn into a wire so fine that a mile of it weighs only an ounce. This delicate wire is then flattened, extended still farther and twisted compactly around a silk thread.

GOLDSBORO, N. C., the county seat of Wayne County, fifty miles southeast of Raleigh, on the Neuse River and on the Southern, the Norfolk Southern and the Atlantic Coast Line railroads. The city is in an agricultural region and has cotton and oil mills, machine shops and manufactories of furniture, agricultural implements and other articles. It has a public park and is the location of the Eastern Insane Asylum, a sanitarium and a community recreation center. There are two parks. Population, 1920, 11,296; in 1930, 14,985, a gain of 32 per cent.

GOLD'SMITH, OLIVER (1728-1774), an Irish writer of prose and verse, born at Pallass, County Longford, Ireland. He graduated from Trinity College, Dublin, and was advised by an uncle, who had already borne a large part of the expenses of his education, to prepare for holy orders. Rejected for holy orders, he became tutor in a family, but soon had to leave on account of a dispute with the master of the house over a game of cards. He then went to Edinburgh to study medicine. Here he remained eighteen months, during which time he acquired some slight knowledge of chemistry and natural history. At the end of this period he went to Leyden, where he studied for nearly a year. Afterward he wandered over a large part of France, Germany, Switzerland and Italy. He had no money to pay his expenses during this walking tour, but his kindliness and humor won him friends everywhere, and his skilful playing on the flute gained him a scanty living.

He reached London in 1756 with a few cents in his pocket, and then followed some years of hard experience as a chemist's assistant, a medical practitioner, a proof reader and a school usher. Turning his attention to writing, he conducted a department in the

Monthly Review and wrote essays in the *Public Ledger* and in a weekly pamphlet entitled *The Bee*; but it was not until the publication, in 1764, of *The Traveller* that he won recognition. Two years later appeared *The Vicar of Wakefield*. This novel, which to the present day is popular, was sold to the publishers for sixty pounds, that Goldsmith might obtain money to pay his landlady, who had had him arrested for debt. In 1768 his comedy entitled *The Good-natured Man* was acted at Covent Garden with but indifferent success, but *She Stoops to Conquer*, produced some years later, attained at once the great popularity which it has kept to the present day. His poetical fame was greatly enhanced by the publication of his *Deserted Village* in 1770. Goldsmith completed, as mere task-work, histories of England, Greece and Rome, and a *History of the Earth and Animated Nature*, of no scientific value. Recognized as one of the great writers of the time, he was sought after by the most famous literary men and was a member of the renowned club to which Johnson and Reynolds belonged. His last days, however, were embittered by the pressure of debt, incurred partly by his improvidence and partly by his generosity. The manners of Goldsmith were eccentric, even to absurdity; but his kindly and sympathetic nature and his rare humor always won him loyal friends. Washington Irving has written a remarkably sympathetic biography of Goldsmith.



GOLF, a popular game for both men and women, though the latter have asserted their right to play it only within recent years. Credit for the origin of golf is given to Scotland, where for several hundred years it has been played with the most punctilious observance of rules of courtesy, which has classed it from the beginning as a "gentleman's game." As it has become popularized, particularly in America, there has become noticeable in many players a certain lack of decorum and an absence of self-restraint, qualities which are designed to impart to the game a particular charm.

Golf is played in large, open spaces. A "short course" needs at least seventy-five acres; a "long course" requires not less than 150 acres. In a short course there are nine holes, or cups, which are the players' objectives; in a long course, eighteen holes. These holes are from 100 to 600 yards apart; the direction from hole to hole is immaterial, but no direct path between two holes may cross another like path.

Each cup is four and one-half inches in diameter and four inches deep, and each is marked with a flagstaff and flag or other

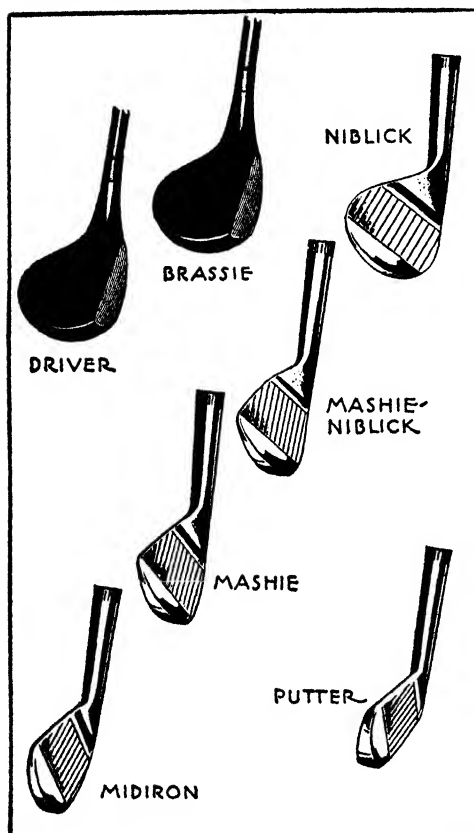
sand or long, narrow mounds of earth, interposed as *hazards*. The presence of these test the skill of the players.

How the Game Is Played. If played by two, the game is started by one of the players putting his ball on a little *tee*, or elevation of sand, and driving it as far as possible toward the first hole. As soon as he has played, his opponent begins in a similar manner, and from then on they play from the spots where their balls lie, until both have *holed out*, that is, put their balls into the first hole. The one who does this with the fewer strokes wins that hole. The balls are then taken to a spot near the first hole, and they are driven off from a tee as before, except that the winner of the first hole is the first to play on the second. After this manner the game is continued until all of the holes are played. Two styles of game prevail. In one style the winner of the game is the person who puts his ball in the holes with the fewer strokes. In the other style, the person who wins the most holes wins the game. The former is known as *medal play*; the latter, as *match play*. Three or four persons may play at one time with such modifications of the rules as are made necessary; when four play, the game is called a *four-some*.

The clubs, or sticks, are of different sizes and shapes, according to the use to which they are put. One club is designed to drive the ball a long distance; another, to raise it high in the air; a third, to take the ball out of a difficult position; a fourth, to use on the green only. Each club has its own particular name, and different players sometimes favor different clubs for the same purpose.

The ball is made of resilient composition, 1.68 inches in diameter, and painted white, in order that it may be distinctly seen. Usually the surface is more or less roughened, so that the clubs will catch it fairly.

No one of the outdoor games has more exacting rules or is played with greater formality. There are public links in the parks of large cities; the game is also played on grounds belonging to private clubs or associations, and these are for members only. Contests are often held between different clubs, and tournaments in which several clubs take part are not uncommon. Every year national tournaments are held, and regularly players come from abroad to take part in these. The best players have an



GOLF CLUBS

conspicuous emblem which may be removed as players approach it. The cup is in the center of a square of perfectly smooth ground called a *green*. It was given this name from the velvety smoothness of the turf which is typical of this part of the course, and this area is thirty to forty feet square. Between the cups are broad *fairways* of smooth turf, with occasional pits of

astounding amount of skill, and the number of strokes required to carry the ball over difficult ground and into the hole is small.

GOLIATH, the Biblical giant slain by David, a native of the town of Gath (*I Sam. XVII*). His height was "six cubits and a span," which, taking the cubit at twenty-one inches, would make him a little more than eleven feet. The Septuagint and Josephus read, "four cubits and a span."

GOMEZ Y BAEZ, *go'mes e bah'es*, MAXIMO (1826-1905), a Cuban general, born at Bani, Santo Domingo. He served in the Spanish army, but became an opponent of Spanish rule in Cuba, quit the army and settled as a planter. During the insurrections of 1868-1878, he was an active commander of the Cuban forces. At the close of the struggle he went to Jamaica and then to



MAXIMO GOMEZ Y BAEZ

Santo Domingo, but in 1895 returned to Cuba and became general in chief of the forces of the Republic. When the Americans landed in the island, he showed marked friendship and earnestly cooperated with them.

GOMPERS, SAMUEL (1850-1924), an American labor leader, one of the founders and the first president of the American Federation of Labor. He served as the head of that organization continuously (except for the year 1894) from 1882 until his death. Gompers emigrated to America from England when a boy of thirteen. He was the first registered member of the Cigar-Makers' International Union, and was untiring in his efforts to strengthen the labor union movement in America.



SAMUEL GOMPERS

His influence among American laboring men was directed to good purpose after the United States entered the World War, and the loyal response of the workers to their country's need had no small part in winning the war. Gompers differed from those labor leaders in Europe who favored an international conference of delegates from both allied and enemy countries, and who hoped to secure a negotiated peace. He headed a labor commission which went to Europe in 1918 to combat these ideas, and was successful in convincing French and English leaders of the necessity of a peace by victory. In 1919 he was a prominent delegate at an inter-allied labor conference held in Paris concurrently with the peace conference. His writings include *Labor in Europe and America*, *American Labor and the War* and *Out of Their Own Mouths*. See LABOR ORGANIZATIONS.

GONDOLA, *gon dok'lah*, a barge used on the canals of Venice, which has often been pictured in painting, song and story. No tourist ever visits the Italian wonder city without taking a ride in one of these picturesque flat-bottomed boats, with the ends curving directly upward to a sharp point. The ordinary gondola is about thirty feet long and four feet wide, and toward the middle it has a curtained compartment for passengers. The boats are painted a somber black, in accordance with an old law passed to prevent gondola owners from vying with each other in sensational decoration of their barges.

GONSALVO DE CORDOVA, *gon thak'vo da kor'do vah*, GONZALO HERNANDEZ Y AGUILAR, about (1453-1515), a famous Spanish commander, known as the *Great Captain*. He distinguished himself in the Portuguese War, which began in 1475, and in the war with the Moors, which ended with the conquest of Granada in 1492. In 1495 he was sent to assist Ferdinand, king of Naples, against the French, and in less than a year he had driven the French out of Naples. In 1500 Louis XII of France and Ferdinand of Aragon decided on the conquest of Naples, and Gonsalvo was sent to capture the city. He was successful in this enterprise, but Spain and France could not agree as to the division of the spoils, and in a war Gonsalvo won for Spain. He was appointed viceroy of Italy, but some years later lost his office and much of his influence through the jealousy of the king.

GOOD FRIDAY, a holy day of the Christian Church, observed in memory of the crucifixion of Jesus. It is the last Friday before Easter, and has been celebrated from a very early period. In the Roman Catholic Church Good Friday is a day of fasting and prayer for all classes of people, but no mass is said. In many Protestant churches the day is observed with much solemnity.

GOOD ROADS MOVEMENT. See ROADS AND STREETS.

GOOD TEMPLARS, INDEPENDENT ORDER OF, a fraternal order, organized at Fayetteville, N. Y., in 1851. It is a temperance brotherhood, which combines the principles of teetotalism with certain rites, secret signs, passwords and insignia peculiar to itself. The first grand lodge was established in 1852. The organization consists of local subordinate lodges, county district lodges, national grand lodges and an international right worthy grand lodge. A juvenile order is also attached. There are at present two national grand lodges (United States and Canada) and seventy grand lodges, with a membership of about 600,000, including about 250,000 in the juvenile branch. The Order of Good Templars was primarily responsible for forcing the liquor question and national prohibition into the arena of politics.

GOOD WILL, the benefit accruing from a business beyond the mere value of the capital, stock, funds or property employed in it. Good will arises in consequence of the general public patronage and encouragement which the business receives, due to its constant and habitual customers, or to its location, reputation and business principles. Good will costs labor and money to acquire, and is as valuable a part of a business as the stock or buildings. It is legally considered a subject of sale or disposal, along with the stock, premises, fixtures and trade debts.

GOODWIN, NATHANIEL CARL (1857-1919), an American actor, born in Boston. His first appearance was in a play called *Law in New York*, in which he was very successful, and his next success was *Black-eyed Susan*. In 1877 he married Eliza Weathersby. For the next fifteen years most of his work was in light comedy. After this he played *A Gold Mine*, *A Gilded Fool*, *In Mis-soura*, *An American Citizen*, *Nathan Hale*, *The Cowboy and the Lady*, *When We Were Twenty-one* and *The Genius*. He was married five times; his second wife was Maxine

Elliott, a well known actress; his third was Edna Goodrich, also an actress. He was about to marry a sixth when he died.

GOODYEAR, CHARLES (1800-1860), an American inventor who patented a new process in the manufacture of rubber. He was born at New Haven, Conn. His early education was meager, and he began his career in the manufacture of hardware in Philadelphia. In his day rubber was defective in that it was stiff and brittle in cold weather and soft and sticky in hot weather. The improvement which he made consisted in mixing the rubber with sulphur and at the same time heating it to the melting point. This process is called *vulcanizing*. He worked nine years, beset by almost insuperable obstacles and dire poverty, to bring his idea to success.

Goodyear was awarded the great coronal medal at the London Exposition in 1851 and the grand medal of honor at the Paris Exposition in 1855, and was also presented with the cross of the Legion of Honor. His patents are now in general use in all countries in the manufacture of rubber, and credit is due him for discovering many practical uses of rubber. The largest rubber company in the world, in Akron, Ohio, is named for him.

GOOSE, a large web-footed bird, related to the duck and the swan. The domestic goose, of which there are many varieties, all nearly alike, lives chiefly on land. It is valued for the table, for its quills and for its fine, soft feathers, which are used in making pillows and mattresses. A rich delicacy called *pâté de foie gras* is obtained from the livers of fattened geese. The *Canada goose* (which see) is the common wild goose of North America. In the spring these geese are seen flying northward in V-shaped flocks, and as cold weather approaches, they return to the South. Other species are the *gray goose*, or *gray-lag*, of Europe and Northern Asia, and the *pigeon goose*, of Australia and Tasmania.

GOOSE'BERRY, a low branching shrub, growing wild in Siberia, in the northern part of Europe and in North America. The branches are armed with numerous prickles and bear inconspicuous flowers and leaves having from three to five lobes. The fruit is a succulent, acid berry and much used for the table. Gooseberries are easily and extensively cultivated, and the bushes are prolific.

GOOSEFOOT, a genus of plants, so called from the shape of the leaves. The plants have clusters of greenish flowers. There are about fifty species, distributed in Europe, Asia and America. One American species, known as *wormseed*, produces an oil used as a remedy for worms; another, called *quinoua*, is an important article of food in South America.

GOPHER, *go'fur*, the name of various burrowing animals, natives of North America. The true gopher is remarkable for hav-



STRIPED GOPHER

ing fur-lined pouches on the sides of its face and neck. In some species these pouches extend from the mouth to the shoulders. They are used in carrying food and also in carrying out dirt from the burrows. The common *striped gopher*, or *prairie squirrel*, of the West is a different animal. It does considerable damage to fields, making burrows so numerous that a network of passageways is formed under the surface. The name gopher was formerly applied by the early French settlers to any animal that honey-combed the soil. Several burrowing squirrels also have this name in various parts of the world.

GO'RAMY, or **GOURAMI**, *goo'ra mi*, a Chinese fish allied to the climbing perch, greenish brown in color, with slight vertical stripes of darker hue. It is one of the few fishes that build nests, and these are constructed by interweaving the stems and leaves of water plants. It is usually regarded as the best table fish of Eastern waters, and is artificially cultivated in tanks and pools by the Malays and Dutch of the East Indies. It grows to a length of from two to five feet.

GOR'DIAN KNOT. According to ancient legend, Gordius, a Phrygian peasant, was, through the intervention of the gods, raised to the honor of king of Phrygia. Through gratitude he dedicated to Zeus his cart and yoke, the knot of which was tied in an exceedingly skilful and complicated manner. Oracles had foretold that whoever should unloose the knot should be the ruler of all

Asia. Many attempts had been made to untie the knot, but when Alexander the Great came to Gordium he cut the knot with his sword and asserted that he had realized the prophecy. To-day when "cutting the Gordian knot" is referred to it means that a serious difficulty is being overcome. It is a common reference in literature.

GORDON, CHARLES GEORGE (1833-1885), a British soldier, known as *Chinese Gordon* and *Gordon Pasha*. He served through the Crimean War, and after the Chinese War in 1860 he remained in China, rose in rank and for his effective service in putting down rebellions was honored by China and by England. From 1877 to 1879 he was governor of the Sudan under the khedive. For a few months in 1882 he held an appointment at the Cape, and he had just accepted a mission to the Congo from the king of the Belgians, when he was sent to withdraw the garrisons shut up in the Sudan by the insurgent Mohammed Ahmed, called the Mahdi (Messiah). Proclaiming a holy war in 1881, he later annihilated an Egyptian army. While attempting to effect the evacuation of the Sudan, Gordon was besieged in Khartum by the rebels, and held that town for ten months, against heavy odds. A British force under Lord Wolseley was sent to raise the siege, but two days before the relief expedition arrived, January, 1885, the town was betrayed into the hands of the Mahdi, the British troops were too weak to offer any effectual resistance, and Gordon was murdered. There is much interesting information in a journal written by Gordon during the latter part of the siege. Morley's life of Gladstone also has a chapter on the final period of Gordon's career.

GORDON, CHARLES WILLIAM (1860-), a Canadian novelist and clergyman, best known by his pen name, RALPH CONNOR. The novels which gained him widest popularity are tales of the mines, farms and lumber camps of the great Northwest, a phase of Canadian life that he knows intimately. Gordon was born in the County of Glengarry, Ont., whither his father and mother had emigrated from Scotland. Like his father, he became a Presbyterian minister. After his graduation at the University of Toronto, he studied theology at Knox College, Toronto, and in 1890 was ordained. The next three years he spent in the North West Territories as a missionary to the miners and

lumbermen, and in 1894 accepted the pastorate of a Presbyterian Church at Winnipeg. He entered deeply into the religious and social problems of the country, and was ardent in patriotic work during the World War, spending several months as chaplain with the Canadian forces at the front.

Gordon's novels are vivid tales of life as he witnessed it, and they also have a strong religious element. They include *Black Rock*, *The Sky Pilot*, *The Man from Glengarry*, *The Prospector*, *Gwen*, and *The Foreigner*.

GORGAS, WILLIAM CRAWFORD (1854-1920), an American physician who gained an international reputation as a sanitarian by his conquest of disease in the Panama

went to Europe in connection with the medical service of the American Expeditionary Force.

GORGONS, *gawr'gonz*, in Greek mythology, three frightful female monsters, who had large teeth and claws of bronze. Their bodies were covered with impenetrable scales, and serpents sprang from their heads in lieu of hair. Their glance was so terrible it turned mortals to stone. Two of them were immortal; Medusa, the mortal one, was killed by Perseus. See **MEDUSA**.

GORILLA, *go ril'a*, the largest of the apes, a huge, ungainly animal that usually walks on all fours, but is able to walk uprightly. It is as tall as a man, and so powerful that



GROUP OF GORILLAS

Canal Zone. He was born in Mobile, Ala., studied at the University of the South, and received his medical training at the Bellevue Hospital Medical College. In 1880 he was made surgeon in the United States army, and received various promotions before his appointment in 1898 as chief sanitary officer in Havana. He remained there for five years, and did such efficient work that yellow fever was practically eliminated.

In 1904 he was made chief sanitary officer of the Panama Canal Zone, and his work there practically transformed the district from a breeding spot for yellow fever and malaria to a healthful place where Americans can live and work without danger. In 1914 Gorgas was made surgeon-general of the United States army, and in 1915, by special act of Congress, was made major-general. His term as surgeon-general of the army expired in October, 1918. The same year he

it can easily rend the strongest of men. The animal is dreaded as an adversary because of his ferocity when angered; in his domestic life, however, he is a model for many other animals. He has only one wife—if his mate can be so called; he pays assiduous attention to her, and watches carefully over his family.

Gorillas live usually in trees. They make a sleeping place somewhat like a hammock in appearance, joining the branches of the thickly leaved parts of the tree by long and tough stems of plants. This bed-chamber they line with grass. These animals are naturally vegetarians, but they will eat meat on occasion; their food usually consists of nuts, eggs, honey, the fruits of various palm trees, and the like.

Nothing was known in Europe of gorillas until 1847. When previous reports of them reached civilization they were regarded as exaggerations, but in 1859 explorers proved

their existence. It is believed that not more than 2,000 of them are now living.

GORKI, *gor' ke*, MAXIM (in full, ALEXEI MAXIMOVITCH PESHKOV, 1868-1936), a famous Russian novelist and reformer, born at Nizhni Novgorod, renamed Gorki. His parents were in humble circumstances, and during early life he was employed successively as shoemaker, gardener, cook and clerk. Finally he gave up all employment and became a tramp. During his travels he secured much of the material which he used in his novels.

In later years he devoted himself to spreading the liberal political movement. He joined the Social Democrats and took sides with the Bolshevik faction. In 1905 he was arrested and exiled until 1913; he corresponded with Lenin and worked for the labor movement.

Following the Revolution he led cultural activities among the Russian masses, but ill-health forced him to return to Capri. On the occasion of his visits to Russia he was always warmly welcomed. The city of Nizhni Novgorod was renamed Gorki, in his honor. He had a friendly disposition and his whole attitude was that of tolerance.

Among his best-known works, all of which are extremely tragic and are written in an emotional style, are *Song of the Falcon*, *Foma Gordyeff*, *The Outcasts*, *Three Men*, *Reminiscences of Tolstoy*, *Comrades*, *Mother*, *Decadence*, *Bystander*, *The Magnet*, and *Other Fires*. These last three belong to Gorki's greatest contribution to historical fiction dealing with Russia.

He was the author of several dramas, of which the most important are *The Summer Folk*, *The Children of the Sun*, *The Barbarians*, and *Lower Depths*. All are concerned with Russian political life.

GOS'HAWK, the largest of the short-winged hawks, formerly used in falconry. It is grayish above, white below, with ashy brown bars. In the United States and Canada there is but one species native; this is larger and handsomer than the European species and is commonly called the *hen hawk* or *chicken hawk*.

GO'SHEN, the name of the portion of Egypt assigned to Jacob and his family, when they entered the land to escape famine (*Gen. XLVII*). Goshen was located on the eastern border of the Nile delta, but its boundaries are indefinite. The land was especially well suited to grazing, and it was here that the Hebrews remained until they were en-

slaved by the Egyptians. The Book of *Genesis* relates the romantic story.

GOS'NOLD, BARTHOLOMEW (?-1607), an English navigator and Atlantic coast explorer. In 1602, with an expedition equipped by Raleigh, he sailed along the New England coast from Maine to Buzzard's Bay and returned home with a cargo of furs and woods, which, together with his personal influence, was the chief cause of the organization of the London Company that colonized Virginia. He went with the first expedition in 1607, but died from fever after arriving in America.

GOS'PELS, the first four books of the New Testament, so called because they give an account of Christ's mission. The word originally meant *good tidings*, but it came to mean *God's story*. The first three books of the New Testament are known as the synoptic gospels, as they contain about the same accounts and give a summary or synopsis of Christ's Galilean ministry. They were written about A. D. 65 or 80. According to some critics, they depend on some previously written account. Matthew, as a Jew, pictures Christ as a royal Messiah; Mark writes for the Gentiles and shows Christ's love for the poor and the outcast. All give Christ's talks in the simple speech of the common people, with parables giving directions for Christian living. The gospel of John contains an account of Christ's life in Judea and many events not given in the other three. Its date is about A. D. 90. The teachings of Christ are given in figurative language, with Jesus himself as the subject. Some critics account for this difference in the fact that John was more closely associated with Jesus and that the account given was of work in very different surroundings.

Related Articles. Consult the following titles for additional information:

John, Saint	Matthew, Saint
Luke, Saint	Mark, Saint

GOSSAMER, *gos'a mer*, the very fine thread of spider's silk which floats through the air, sometimes traveling great distances. The spiders of one species are so prolific the young have to scatter as soon as hatched in order to find enough to eat. The exceedingly-minute animals climb to the top of the nearest bush, unfurl a delicate gossamer thread to the gentle breeze and sail away upon it.

GOTH'AM, a name given by Washington Irving to New York City. The original Gotham was an English village whose people

were known for their follies, and whose fame was perpetuated in 1568 in the "Merry Tales of the Mad Men of Gotham."

GOTHENBURG, *go'ten boorg*, or **GOTE-BORG**, *gü'te boorg*, SWEDEN, a seaport second to Stockholm in population and trade. It is the capital of the län, or province, of the same name, and is situated at the mouth of the Göta-Elf, in the Kattegat. Gothenburg is one of the best-built cities in Sweden and is the seat of a bishopric. It has manufactures of sail cloth, cotton and other goods and possesses shipbuilding yards, tobacco factories, breweries and sugar refineries. The trade is very extensive, the harbor being excellent and always free from ice. The city has excellent educational institutions, including a university attended by about 2,000 students. Population, 1934, 252,725.

GOTHIC ARCHITECTURE. See ARCHITECTURE.

GOTHS, an ancient Teutonic tribe, occupying, when first known to history, the region adjacent to the Black Sea, north of the Danube. About the middle of the third century they began to encroach on the Roman Empire. In the fourth century the great Gothic kingdom extended from the Don to the Theiss and from the Black Sea to the Vistula and the Baltic. About the year 369 internal disturbances divided the Gothic kingdom. Henceforth these people were known as Ostrogoths (eastern Goths) and the Visigoths (western Goths). In 396 Alaric, king of the Visigoths, made an irruption into Greece, laid waste the Peloponnesus and became prefect of Illyria. He invaded Italy and sacked Rome in 409, and a second time in 410. After his death, in 410, the Visigoths succeeded in establishing a new kingdom in southern Gaul and Spain, of which, toward the end of the fifth century, Provence, Languedoc and Catalonia were the principal provinces, and Toulouse was the seat of government. The last king, Roderick, was killed in 711 by the Moors, who had crossed from Africa and overrun Southern Spain. After the overthrow of the Western Roman Empire in 476, the Eastern emperor, Zeno, persuaded Theodoric, king of the Ostrogoths, to invade Italy. The Goth became king of Italy in 493 and laid the foundation of a new Ostrogothic kingdom, which came to an end in 554. Subsequently the Goths both here and in Spain entirely disappeared as a distinct people.

GOUGH, *gof*, JOHN BARTHOLOMEW (1817-1886), probably the world's most famous temperance lecturer, was born in England. He emigrated to America when but a boy, worked on a farm in New York and afterward was for a time in a bookbindery in New York City. He lost his position through drinking, and for a time earned a living by singing in saloons; but he was induced at last to sign a pledge, and from that time he lectured in a fiery manner on behalf of temperance. He attained a very wide reputation and visited Europe several times. He published an *Autobiography*, a volume of sketches, *Sunlight and Shadow, or Gleamings from My Life Work*, and his lectures.

GOULD, *goold*, GEORGE JAY (1864-1923), an American capitalist, born at New York, the son of Jay Gould. He was privately educated and when he became of age assumed direction of many of his father's railroad and other commercial enterprises. Under his energetic management the Gould interests were vastly extended and embraced a total railroad mileage of more than 21,000 miles, besides large holdings in the Western Union Telegraph Company, the Equitable Life Assurance Society, the Pacific Mail Steamship Company, numerous national banks and other corporations. The Gould railway interests include the Wabash, the Missouri Pacific, the Texas and Pacific and the St. Louis, Iron Mountain & Southern. Gould married Edith Kingdon, a popular actress; they resided in New York City.

GOULD, HELEN MILLER. See SHEPARD, HELEN GOULD.

GOULD, JAY (1836-1892), an American capitalist, born at Roxbury, N. Y. He began active life as a surveyor, and in 1856 he entered the tanning and lumber business. Later he bought railroad stocks, disposed of them at a great profit and in 1859 established himself as a broker in New York City. He gained control of the Erie Railroad when it was in financial distress, and constantly added to his railroad holdings, until he owned more than one-ninth the railroad mileage of the country (1880). His usual method was to depress the value of the stock in the open market, and then to buy quickly. In this way he secured control of the Union Pacific and the Missouri Pacific at a time when their stocks were almost worthless and developed them into paying roads. He was a prime mover in the consolidation of tele-

graph lines and in the founding of the Western Union Company. In 1869 he was interested with James Fisk in an attempt to "corner" the gold market. It resulted in "Black Friday," one of the most disastrous financial episodes in American history. He left a fortune estimated at \$70,000,000.

GOUNOD, *goo no'*, CHARLES FRANÇOIS (1818-1893), a great French composer, born at Paris. He studied at the Paris Conservatory and afterward in Italy. His first important mature work was *Faust* (1856), which raised him to a high rank among composers. Other operas followed, among which *Romeo and Juliet* (1867) is the best. Gounod's study of church music during his stay in Rome emphasized the religious tendencies of his nature. To these he gave expression in *Saint Cecilia's Mass* and other sacred music. He wrote also a *Messe Solennelle*, a motet, *Gallia*, and other choral works and songs. *Saint Cecilia's Mass* and the oratorios *Redemption* and *Death and Life* are masterpieces of musical technique and are surcharged with deep, spiritual feeling.



GOUNOD

GOURD, *gord*, or *goord*, the popular name for a family of plants, as well as for the typical genus of that order. The gourd was first known in the Holy Land. The fruit of these plants is also known by the same name. The plants bear annual or perennial stems, trailing or climbing by tendrils, and large alternate leaves. The corolla is either yellow, white or green and sometimes is large and handsome. The fruit is fleshy and succulent. There are more than fifty genera and about 300 known species of gourds, many of which are useful or remarkable. Among them are the squash, the melon, the cucumber, the pumpkin, the colocynt and the bryony. They are natives of both hemispheres, chiefly within the tropics, but the more valuable ones are now commonly cultivated in most parts of the world. On some species the outer coat, or rind, is so hard that bottles and water cups are made from the fruit.

GOUT, *gowt*, a constitutional disorder, giving rise to paroxysms of acute pain, and accompanied by a specific form of inflammation. It appears chiefly in the male sex and attacks occur at intervals. Gout is very often preceded by, or alternates with, disorder of the digestive organs. It seizes the patient usually at night, causing violent pains in the big toe or in the heel or calf of the leg. These pains last all night and are excruciating, especially if the patient moves or is jarred. A second night of pain is usually followed by sudden relief from pain, although swelling and fever remain in the limb. Similar attacks may occur at short intervals through a period of several weeks, or even months, the whole constituting what is commonly called a "fit of the gout." It may be acquired or hereditary. In the former case it rarely appears before the age of thirty-five; in the latter, it is frequently observed earlier. It appears that the disease is due to an excess of uric acid in the blood. Indolence, inactivity and too free use of sour wines, fermented liquors and very highly seasoned and nitrogenous food are the principal causes. Strict regulation of the habits of life is one of the most important elements in the treatment of gout.



GOVERNMENT is control, rule, direction of affairs, applied particularly to a political division, as a city, county, state, province or nation. There have been many kinds of government. In times past in many parts of the world one man's will has decided the fate of millions of his subjects, while elsewhere, in sharp contrast, the will of the majority has been superior to the mandate of any man.

In 1776 the American Declaration of Independence declared that governments derive their just powers "from the consent of the governed." At that time, in practice, this was true in but few countries; but the statement was prophetic.

For a century and a half "rule by the people" was an ideal that found expression mainly on the American continents. After

the World War, several European states became republics—notably Poland, Germany, Austria, Greece and Turkey. The greatly disturbed conditions in many of these countries, combined with a lack of training and experience in popular government, resulted in several instances in the rise of dictators, who, by force of personality, grasped the reins of power, either by the expressed or tacit consent of the people. Such instances were those of Benito Mussolini in Italy, Marshal Pilsudski in Poland, Adolph Hitler in Germany.

Kinds of Government. The governments of the world may be classified as follows:

Democracy. This is a general term for a people who control their governmental affairs, regardless of the title of the executive head of the nation. England is a democracy, under a king who has little actual power; the United States, a republic, is also a democracy, under a President, as in France, Switzerland, and all the free countries of South America. In a democracy the people choose the men who exercise the authority the people themselves confer.

Pure Democracy. Imagine a country so small that all the people can meet in one place to make their laws and the same time choose the men who are to wield authority. This would be an example of pure democracy. The New England town-meeting was an example of pure democracy, as is the township to-day, in all matters relating solely to itself.

Republic. A republic is a democracy so large that it cannot be a pure democracy. In such a country the people cannot all participate in law-making, so they choose from their whole number certain men to represent them in a law-making body. These men act for all the people, and their mandates express the people's will. The people choose others from their numbers to enforce the laws; the chief executive is not an hereditary officer, but is of limited term of office. He is usually called President. In a republic the lowliest citizen bears his share, though it may appear small, of the responsibilities of government.

Monarchy. Monarchies have been of two kinds, absolute and limited. An absolute monarchy is a country in which the will of the ruler is the supreme law of the land. No man, no legislative body, has authority superior to his. Russia under its czars and Turkey under its sultans were for centuries examples of absolutism.

A limited monarchy is a country in which the will of the ruler to govern according to his fancy is curbed or limited by legislative bodies and executive officers deriving their powers from constitutions dictated by the people. The German Empire was a good example of a limited monarchy which chose to limit, but only in part, the will of its em-

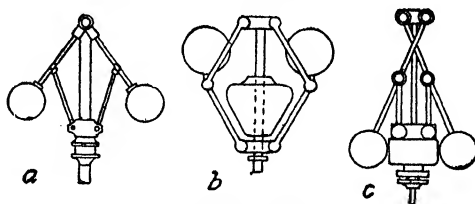
peror; England and the Scandinavian countries are examples of the most enlightened limited monarchies.

Aristocracy, a government by a privileged class, usually nobles, in which the executive is not an hereditary ruler. An aristocracy might arise from the overthrow of the regularly constituted ruler by those powerful enough to accomplish their purpose.

Oligarchy, a country ruled by a group of people, nobles or commoners, who seize the reins of power to correct governmental abuses. The Cromwell period in English history is an example. A dictatorship is a form of oligarchy in which a state endows an individual with power to rule, when the regular constitutional government proves ineffective in maintaining order and discipline.

Related Articles: For local government, see the articles State; Province; County; Township; City; Commission Form of Government, and references there given.

GOVERNOR, a device in machinery for maintaining a uniform velocity with a varying resistance. A common form of steam engine governor consists of a pair of balls, suspended from a vertical shaft, kept in motion



GOVERNORS

a, The simplest form, called Watt's governor; b, Pröhl's; c, Spring governor.

by the engine. When the engine goes too fast, the balls fly farther asunder and depress the end of a lever, which partly shuts a throttle valve and diminishes the quantity of steam admitted into the cylinder; and on the other hand, when the engine goes too slowly, the balls fall down toward the spindle and elevate the valve, thus increasing the quantity of steam admitted into the cylinder. By this device the quantity of steam admitted to the cylinder is proportioned to the resistance of the engine, and the velocity is kept constantly the same.

GOVERNOR-GENERAL, the chief resident official of the Dominion of Canada. The sovereign of Great Britain, George V, is the theoretical head of the government of Canada. He is the sovereign of Canada, just as he is the sovereign of England. As he is unable to be present in person he is represented by a Governor-General. This official has a limited responsibility, the British

Government having a special minister in Canada to look after British interests.

As the chief executive of Canada, the Governor-General assembles, prorogues, (that is, closes the session) and dissolves Parliament, and receives and assents to the bills in the name of His Majesty. In the discharge of all his executive duties he acts with the advice of the Privy Council, which in turn has the support of the majority in the House of Commons. On Canadian questions clearly within the jurisdiction of the Dominion he cannot act apart from his advisers, and is bound by their advice. It is always as the "Governor-General in Council" that he acts, not as the Governor-General. His salary is \$50,000 per year.

Officially, the Governor-General occupies a position of neutrality between opposing political parties. As he can have no possible object in view except to add to his own usefulness and the dignity of his office, he is often in a position to aid the interests of the whole country. He is free to act as the best interests of all concerned seem to dictate. In this respect he enjoys considerable advantage over the President of the United States, who is necessarily a partisan and often driven to partisan measures. The initiative in legislation rests with the Ministry, but there are many occasions when the advice and help of the Governor-General are invaluable. The high character of the men who have held this office may be seen from this list:

The Right Hon. Viscount Monck, K. C. M. G., 1867-1869.

The Rt. Hon. Lord Lisgar, G. C. M. G., 1869-1872.

The Rt. Hon. Earl of Dufferin, K. P., K. C. B., C. C. M. G., 1872-1878.

The Rt. Hon. Marquis of Lorne (later Duke of Argyll), K. T., G. C. M. G., P. C., 1878-1883.

The Most Hon. Marquis of Lansdowne, G. C. M. G., 1883-1888.

The Rt. Hon. Lord Stanley, G. C. B., 1888-1893.

The Rt. Hon. Earl of Aberdeen, K. T., G. C. M. G., 1893-1898.

The Rt. Hon. Earl of Minto, 1898-1904.

The Rt. Hon. Earl Grey, 1904-1911.

H. R. H., Arthur William Patrick Albert, Duke of Connaught, 1911-1917.

His Excellency, the Duke of Devonshire, Victor Christian William Cavendish, 1917-1921.

The Rt. Hon. Lord Julian Byng, Baron of Vimy, 1921-1926.

The Rt. Hon. Viscount Willingdon, G. B. E., G. C. S. I., 1926-1931.

The Rt. Hon. Earl of Bessborough, 1931-1936.

Baron Tweedsmuir (John Buchan), 1936—.

GOVERNOR'S ISLAND, an island in New York harbor, near the southern end of Manhattan Island. It belongs to the Federal government, and is used for naval and military purposes, being fortified by forts Jay, Castle William and South Battery.

GRACCHUS, *grak'us*, a distinguished Roman family, of which the following were the most prominent members: **TIBERIUS SEMPRONIUS GRACCHUS** became consul in 177 B. C. and again in 163. He was the father of the two most celebrated Gracchi, **TIBERIUS SEMPRONIUS** (about 163-133 B. C.) and **CAIUS SEMPRONIUS** (159-121 B. C.). In 133 B. C. Tiberius was elected to the tribuneship. His first efforts were to reform the Roman land system, by restoring or enforcing the old Licinian law, which provided that no one should possess more than five hundred acres of the public lands and that the remainder should be equally divided among the plebeians. By exerting all his prerogatives he managed to pass his bill, but was accused of having violated his office, and at the next election for the tribuneship he was killed. Ten years after the death of Tiberius, the younger Gracchus obtained the tribuneship, renewed his brother's law and revenged his memory by expelling from the city many of his most violent enemies. Several popular measures gained him great favor with the people, but the intrigues of the nobles ultimately caused his fall.

GRACE, **DAYS OF**, a certain number of days, usually three, allowed for the payment of a bill or note after the day on which it becomes due. In some countries it varies from three to ten days. If the last day of grace is a bank holiday the instrument is payable on the next to the last day of grace. The custom of allowing days of grace has been abandoned almost entirely in the United States.

GRACES, *grá'sez*, in classical mythology, the goddesses of grace, daughters of Jupiter, from whom came everything beautiful and agreeable. According to most poets and mythologists, they were three in number, and Hesiod gives them the names of Aglaia (brilliancy), Thalia (the blooming) and Euphrosyne (mirth). Homer mentions them in the *Iliad* as attendants of Juno, but in the *Odyssey* they are spoken of as companions of Venus. He conceived them as forming a numerous troop of goddesses, whose office it was to render happy the days of the im-

portals. The three graces were usually represented slightly draped or entirely nude, locked in each other's embrace or hand in and.

GRACKLE, *grak'ul*, a name applied in America to several kinds of blackbirds, among them the purple grackle, or crow-blackbird, which ranges throughout the central and eastern part of the United States and parts of Canada and Alaska. Many species of the same family are native to India and Europe. One of these, the Indian *minah bird*, can be taught to perform tricks and to imitate the human voice.

GRADY, HENRY WOODFIN (1851-1889), one of the greatest editors the Southland of the United States has produced. He was born at Athens, Ga., and was educated at the University of Georgia and the University of Virginia. As editor and correspondent of various papers, he attracted attention for his articles on the South, and in 1882 he became managing editor and part owner of the *Atlanta Constitution*. He also won a reputation as a public speaker, especially on the theme "The New South."

GRAFTING, the art of propagating plants by inserting a bud or twig of one plant into the stock of another, in such a way that there results a circulation of sap between the parts united. The stem or branch into which the part is grafted is known as the *stock*, and the part inserted into the branch is called the *cion*; the new growth is called the *graft*. There are various methods of grafting, known as budding, whip grafting, cleft grafting and crown grafting.

Budding. In budding, the bud from the axil of a leaf is inserted into the bark of a stock. The bud is prepared by cutting a shield-shaped section of bark, which usually includes a little of the wood, from the plant (see *b* in Fig. 1). A piece of the leaf stock is left on the bark, to serve as a handle in inserting the bud. The stock is prepared by cutting a T-shaped slit in the bark (*a*, Fig. 1). The bark is then loosened from the corners where these cuts meet, and the bud is slipped under, being left in



FIG. 1

such a position that it protrudes from the cut just below where the vertical and cross sections meet. The stock is then wound with

yarn or twine that will yield a little as the bud swells (*c*, Fig. 1). This method is used in the propagation of nearly all young fruit trees, and in the culture of many ornamental plants.

Whip Grafting. In whip grafting the cion and stock are cut so as to have notches and tongues that will exactly fit into each other (*a* and *b*, Fig. 2). The success of this style of grafting depends upon the cion and stock being of the same size. It is generally employed by nurserymen in the propagation of young trees. The prevailing practice is to cut the stock quite close to the root and graft a comparatively long cion upon it. The joint is wound and covered with wax or clay (*c*, Fig. 2).

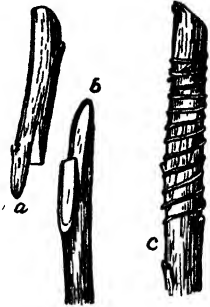


FIG. 2

In the spring the plants are set so that the joint comes just below the surface. As the plant grows, roots spring forth from the grafted cion, so that in a short time this part of the tree has roots of its own.

Cleft Grafting. Cleft grafting is employed with trees that are too large for whip grafting. The branch to be grafted is sawed off, then split through the middle. The cion has one edge sharpened wedge-shaped and is inserted in the cleft in such a way that the bark of the cion will meet that of the stock (*a* and *b* in Fig. 3). The wound is then covered with wax to exclude the air and moisture (*c* in Fig. 3).

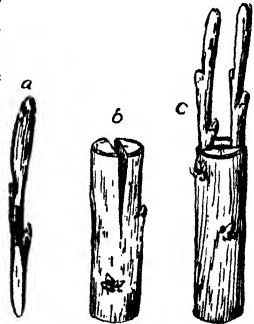


FIG. 3

Crown Grafting. In very large limbs, crown grafting is sometimes used. This is done by sawing off the branch as in cleft grafting, but instead of splitting the branch through the center the bark is loosened at two or three places and the wedge-shaped cion is inserted between the bark and the wood (*a* and *b* in Fig. 4).

Purposes of Grafting. Grafting is done upon the principle that the cion will repro-

duce its kind, regardless of the stock into which it is grafted and upon the further principle that the sap, by a system of osmosis (see *OSMOSIS*), will pass from the stock into the cion. Only the most closely related species can be grafted on to each other with success. Usually plums and peaches can be grafted upon each other, as can apples and pears, but apple trees will not graft upon plum or cherry trees. Nurserymen employ grafting for the purpose of producing variety in plants and also to secure a hardy stock for the plant, as the stock into which the cion is grafted is usually that of a tree native to the locality and one that will withstand the exigencies of soil and climate better than the tree from which the cion was taken.

GRAHAM LAND, a group of icebound, mountainous islands in the Antarctic Ocean, discovered in 1832 by Captain Biscoe, who took possession of it for Great Britain. It is slightly southeast of the southern extremity of South America, and is crossed by the Antarctic Circle.

GRAIL, THE HOLY (spelled also *GREAL* or *GRAAL*), the cup from which Christ drank at the last supper. Many legends have sprung up concerning it. According to one the cup was brought to England by the son of Joseph of Arimathea and was kept by his descendants for centuries, but was finally, owing to the sin of one of its keepers, taken back to heaven. The Grail was visible only to the pure of heart.

The legend of King Arthur became connected with the Grail stories, and many of his knights made quests in search of it. Three of them, Galahad, Perceval and Bors, had sight of it. The legends of the Grail have been used often as literary themes. On the version which connects it with the Arthurian romance Tennyson based his *Holy Grail* in the *Idylls of the King*. *Parsifal*, the hero of Wagner's great music drama of the same name, was a keeper of the grail, and so was Lohengrin. The grail story has furnished the motif for one of the finest monuments of American art, E. A. Abbey's mural

decoration in the Boston Public Library, and for one of the noblest poems in American literature, Lowell's *Vision of Sir Launfal*, familiar to all school children.

GRAIN ELEVATOR, a building designed for the storage, handling and cleaning of grain. Elevators are located along the lines of railway or near docks. The most common ones have the form of a rectangular building, with high walls, surmounted by a cupola, which extends the entire length of the building and is from one to three stories high. The lower portion, or main part of the building, contains bins in which the grain is stored, while the cupola usually contains the machinery for weighing, moving and cleaning the grain, though in some buildings this is found in the basement or at one end of the main body of the building. The latest style of grain elevator consists of one or more cylindrical tanks, constructed of steel, tile or concrete. Since these structures are fire-proof, they are much more desirable than wooden buildings. Grain is unloaded from the cars or from the vessel into the elevators by structures known as *legs*, which are movable boxes containing endless belts, to which buckets are fastened at even intervals. The lower end of the leg is placed in the hold of the ship or at the door of the car, and grain is received into a hopper, from which it is fed to these buckets as the belt is moved by machinery. In this way grain can be unloaded into the elevator and moved from the bottom of the lowest bin to the top, where it can be weighed and cleaned and sent to various bins or to any destination desired. The largest of these buildings thus far constructed is at Port Arthur, Ont.; it will hold 10,000,000 bushels of grain. Elevators of large size will handle from 400,000 to 800,000 bushels in a day.

GRAINS, the name of the fruits of several grasses, as corn, wheat, barley, oats and rye. They contain gluten, starch, a sweet mucilage, an aromatic substance in the hulls, and much moisture. Grains furnish the chief foods of man, being ground into meal and flour, which are included in most articles of diet. The term *grain* is also used to designate the plants themselves. The raising of grains is among the chief agricultural industries. The most productive regions are the valleys of great rivers, such as the Nile, the Po and the Ganges, in the Old World, and the Mississippi, in the New World. The



FIG. 4

prairie region of the United States is the greatest grain-producing region of the world.

Related Articles. For description of the most important grains consult the following titles:

Barley	Oats	Rye
Corn	Rice	Wheat

GRAM, the unit of weight in the metric system, equal to about 15.4323 grains in the English system. A decagram, or ten grams, equals 5.644 drams; a hectogram (100 grams) equals 3.527 ounces; a kilogram (1,000 grams) equals 2.205 pounds; a myriagram (10,000 grams) equals 22.046 pounds. See **METRIC SYSTEM**.

GRAMINEAE, *gram min'ee*. See **GRASSES**.

GRAMMAR, the science which teaches the principles of correct speaking and writing, according to the best standard of the day. The language of every civilized people has its grammar, made up of the body of rules which govern the use of words and their relations to one another. Modern English grammar is very different from the grammar of Queen Elizabeth's time, for this study changes as does the language, and what was correct centuries ago is not necessarily correct to-day. Grammar is therefore not a rigid, unchanging subject, but one which pulses with life.

It is necessary for a person to study grammar if he would write and speak correctly. An understanding of its rules enables the student to know why he should say, "We were" and not "We was," for example. If he does not know the reason for the forms he uses, he has no basis for correct speech except memory and imitation, and these are insufficient for progress. Most grammarians of to-day divide grammar into two parts—the study of words, or *etymology*, and the study of their relations in the sentence, or *syntax*.

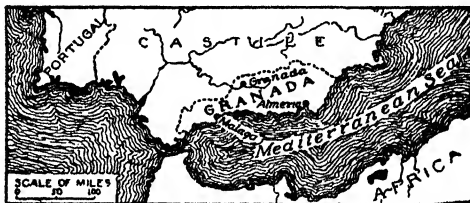
In the article *Language and Grammar* will be found a complete outline for the study of formal grammar, and for the preliminary study upon which it is based. See, also, the various parts of speech, under their titles.

GRAMPIAN HILLS, a mountain system extending diagonally across Scotland in a southwest-northeast direction for about 150 miles. It commences in Argyleshire, and at the boundaries of Perthshire and Aberdeenshire may be said to separate into two distinct branches—one on the north side of the Dee, which terminates near Huntley; the other on the south side of that river which

ends near Stonehaven. The Grampians comprise all the highest summits in Scotland—Ben Nevis, 4,406 feet high; Ben Macdui, 4,296 feet high; Ben Cruachan, Ben Lomond, Cairngorm and Cairntoul.

GRAMPUS, a species of dolphins, found in northern waters and in the Mediterranean Sea. The animals are slaty-gray streaked with white, have spindle-shaped bodies and are remarkably thick in proportion to length. They feed upon small sea animals.

GRANADA, *gra nah'da*, formerly a Moorish kingdom in Spain, bordering on the Mediterranean, including what is now three provinces, Granada, Almeria and Malaga. Its area was about 11,000 square miles, but is now 4,928 square miles. The olive and vine are extensively cultivated, and fruit is very abundant. Sugar cane thrives in some

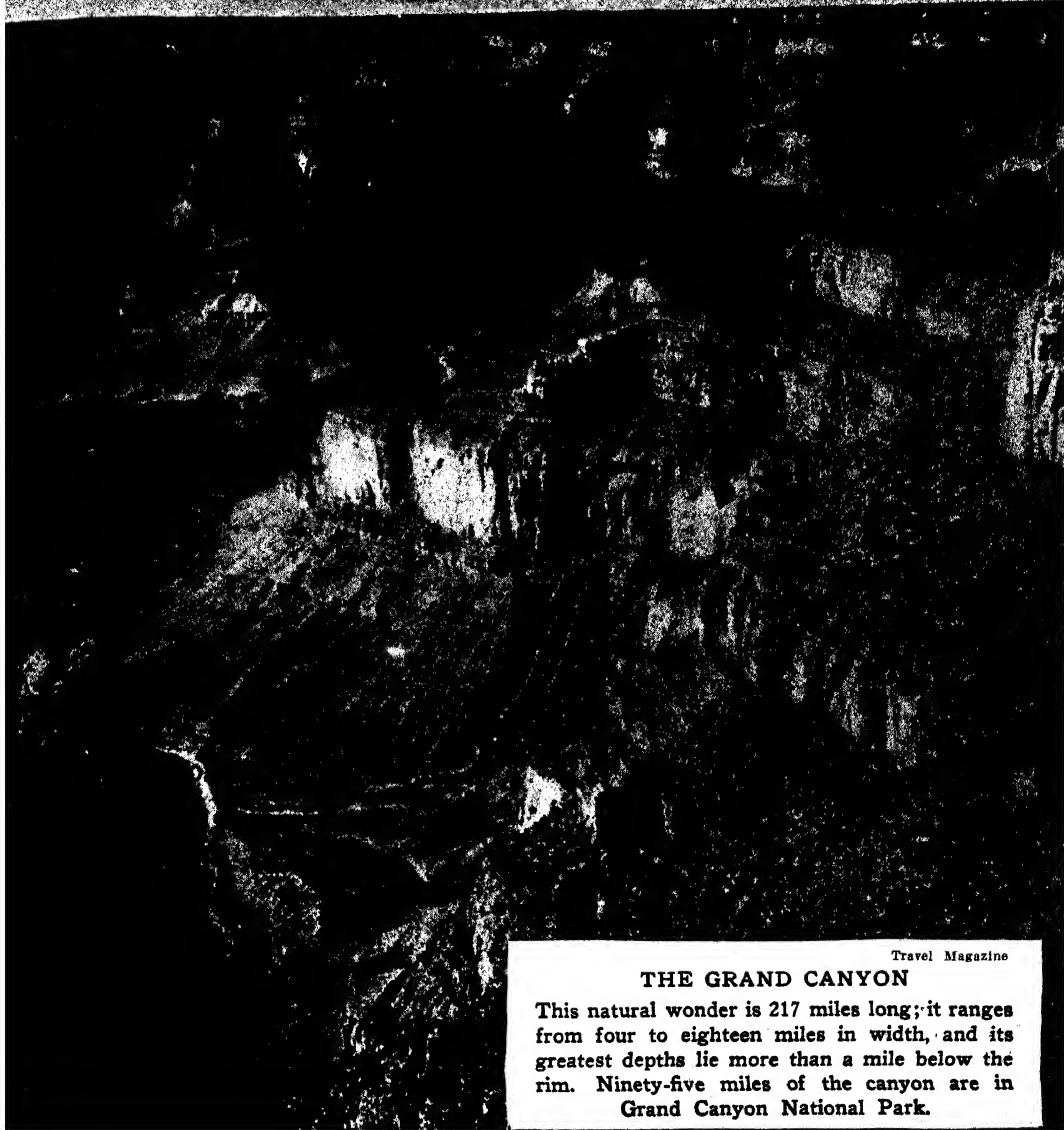
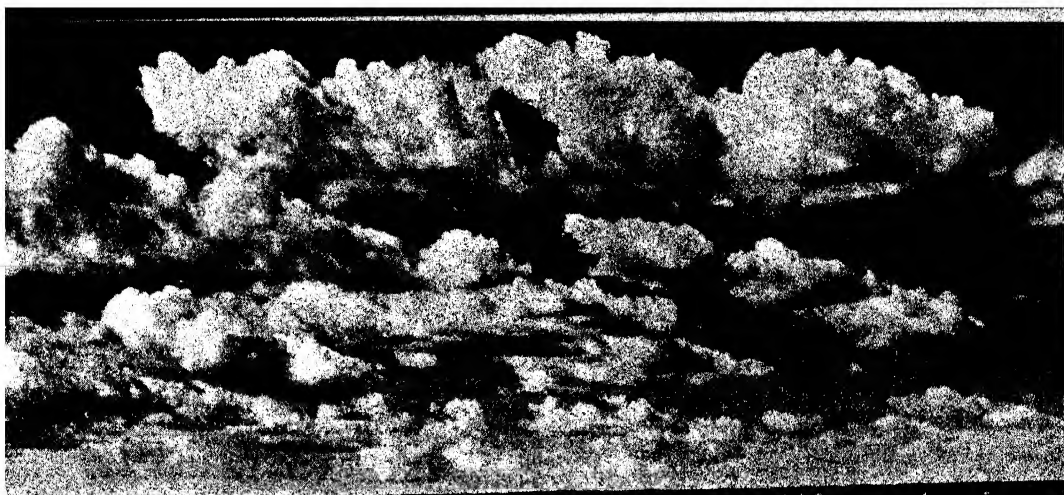


GRANADA

parts. Silver, zinc, iron, lead and coal are mined in considerable quantities. Manufactures are few, consisting chiefly of textiles, chocolate and bricks. After long forming part of the kingdom of Cordova, Granada became a separate kingdom in 1235. In 1492, through its conquest by Ferdinand of Spain, it passed into the possession of the Spaniards. Population, 1934, 664,940.

GRANADA, SPAIN, capital of the province of Granada. It is a city associated with much of the romance of past ages. The streets rise picturesquely above one another, with a number of turrets and gilded cupolas, the whole being crowned by the Alhambra, or palace of the ancient Moorish kings (see **ALHAMBRA**, THE). In the background lie the Sierra Nevada, covered with snow.

The cathedral is an irregular but splendid building; the archbishop's palace and the mansion of the captain-general are also noteworthy, and the Generalife, the summer palace of the Moorish princes, is second in beauty and splendor only to the Alhambra. There are several fine plazas, gardens and promenades.



Travel Magazine

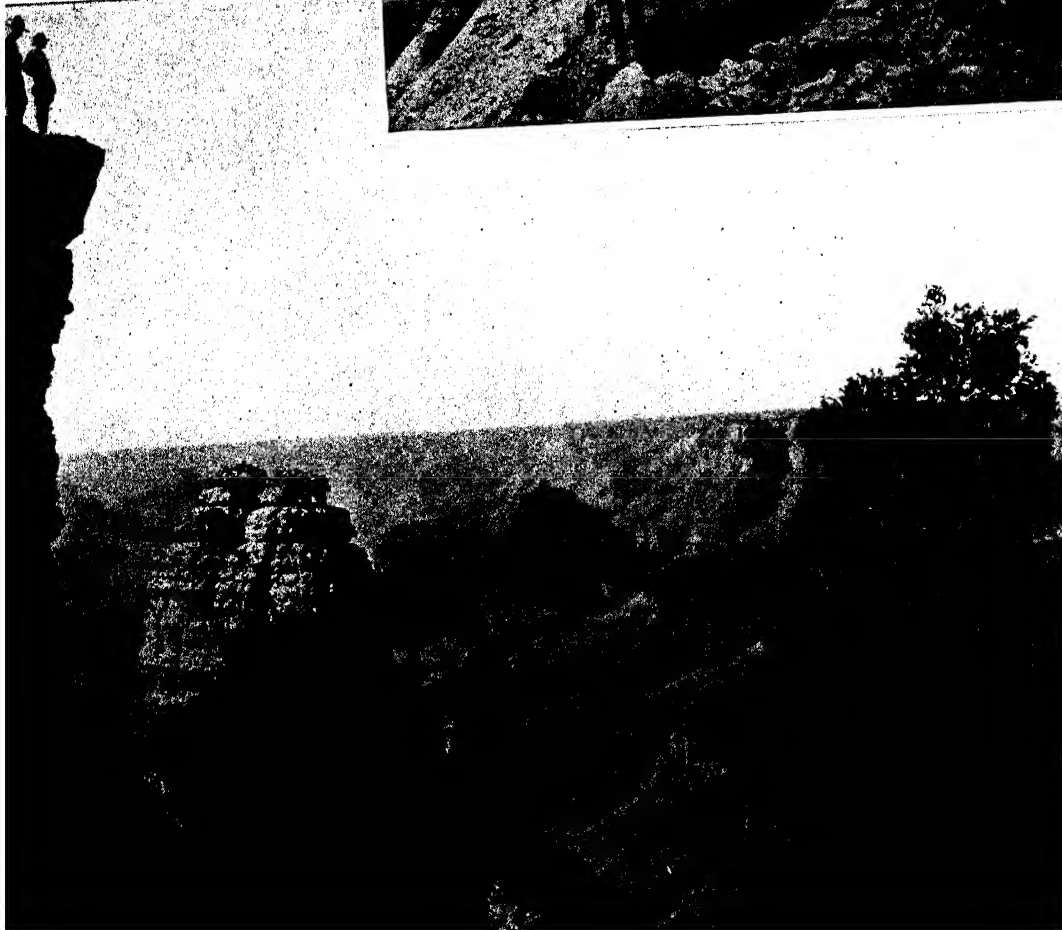
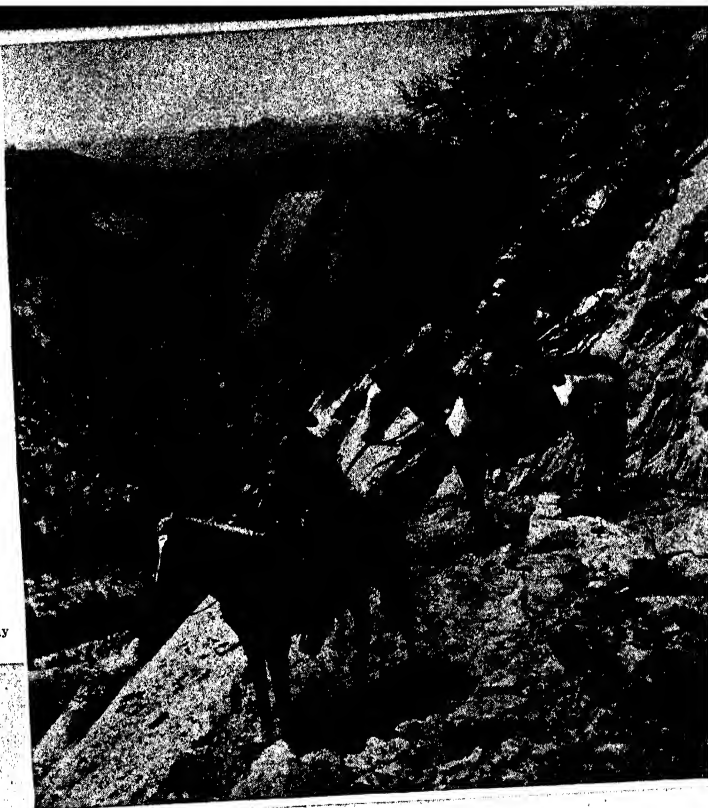
THE GRAND CANYON

This natural wonder is 217 miles long; it ranges from four to eighteen miles in width, and its greatest depths lie more than a mile below the rim. Ninety-five miles of the canyon are in Grand Canyon National Park.

CARVED BY NATURE

ries told by the Hopi Indians to the discovery of the Grand Canyon in 1540 by a member of Coronado's expedition. Viewing the distant Colorado River at the bottom of the gorge overwhelms the traveler at the accomplishment of so tiny a stream.

Magazine—H. A. Roberts—A. T. & S. F. Railway



The city was founded by the Moors before 800, and from 1036 to 1234 it was included in the kingdom of Cordova. In 1235 it became the capital of the Moorish kingdom of Granada and attained almost matchless splendor, with a population of 400,000. In 1491 it remained the last stronghold of the Moors in Spain, but was taken by the Spaniards under Ferdinand and Isabella in 1492. Its prosperity continued almost without diminution till 1610, when the decree expelling the Moors from all parts of Spain brought about the decline from which it has never recovered. Population, 1933, 121,160.

GRAND ARMY OF THE REPUBLIC, a patriotic society, organized in Decatur, Ill., April 6, 1866. Its chief objects are to strengthen the fraternal spirit among the veterans of the Union armies in the Civil War, to perpetuate the memory of those who have died and to assist needy members and their widows and orphans. Any soldier or sailor of the Union army who served between April 12, 1861, and April 9, 1865, and who was honorably discharged, together with all members of state regiments who were subject to Federal officers, are admitted to membership. The society was from the beginning organized into state and territorial departments; these in turn are supported by local societies, the number of which have dwindled to less than 1,000. The largest membership recorded was 409,489 in 1890. Deaths have rapidly thinned the ranks and the surviving membership according to latest reports has dropped to less than 6,000.

Annual meetings, called encampments, are held in the leading cities of the United States. See **CONFEDERATE VETERANS**.

GRAND BANKS. Off the southern coast of Newfoundland there is an elevated submarine plateau, triangular in shape, most of it about forty fathoms under water. Its base stretches 200 miles along the coast, while its apex juts southeastward about five hundred miles. The British and French submarine cables lie upon this elevation. Near the Newfoundland coast the Grand Banks, as this plateau is called, teems with fish, chiefly cod. The resources of the Banks furnish occupation for 100,000 fishermen of British, French and American nationalities.

GRAND CANYON OF THE COLORADO, a splendid gorge chiseled out of the earth by the Colorado River in its course through the plateau region of Northwestern

Arizona. To say that the chasm is a spectacle of unparalleled grandeur is wholly inadequate to describe its glory of height and depth, of immensity and silence, of light and form and color. Many have tried to do justice to this "divine abyss;" all have confessed that there are no words in any language which fittingly describe it. Yet there have been descriptions of the canyon that create in one at least an intense desire to behold this great marvel of Mother Nature; the following is a good example:

"An inferno, swathed in soft celestial fires; a whole chaotic under-world, just emptied of primeval floods and waiting for a new creative word; cluding all sense of perspective or dimension, outstretching the faculty of measurement, overlapping the confines of definite apprehension; a boding, terrible thing, unflinchingly real, yet spectral as a dream. The beholder is at first unimpressed by any detail; he is overwhelmed by the ensemble of a stupendous panorama, a thousand square miles in extent, that lies wholly beneath the eye, as if he stood upon a mountain peak instead of the level brink of a fearful chasm in the plateau, whose opposite shore is thirteen miles away. A labyrinth of huge architectural forms, endlessly varied in design, fretted with ornamental devices, festooned with lacelike webs formed of talus from the upper cliffs and painted with every color known to the palette in pure transparent tones of marvelous delicacy. Never was picture more harmonious, never flower more exquisitely beautiful. It flashes instant communication of all that architecture and painting and music for a thousand years have gropingly striven to express. It is the soul of Michaelangelo and of Beethoven."

The Grand Canyon is about 217 miles long, from 4,000 to 6,000 feet deep, and from one to eighteen miles wide. It is approached from the south, and as the trail runs through a heavily forested country, the tourist is shut out from a view of the wondrous spectacle until he comes to the very brink of the gorge. The picture spread out before him, as he stands on the southern rim, transcends anything he ever saw, or heard or dreamed of—rough crags and level mesas, valleys and peaks, rock formations of every conceivable variety, and everywhere a maze of color. Sometimes these colors—rich reds and yellows, and purple, white and dark—stand out clearly as distinct hues, and again they are all mingled together in one indescribable tone.

There are two trails leading to the base of the chasm—the Bright Angel and the Hermit. It requires a journey of about four hours to

reach the muddy, noisy stream that carved this huge gash in the earth, the stream that from the cavern's brink seems like a narrow ribbon winding its way peacefully along. See COLORADO RIVER.

GRANDFATHER'S CLAUSE, the name popularly applied to provisions of several state constitutions which virtually deprive negroes of their votes. Such enactments seek to nullify locally the Fifteenth Amendment to the Constitution of the United States. They provide that only those people shall vote whose ancestors had the right of suffrage in 1867, which would exclude negroes, or that a test for illiteracy shall determine suffrage. That the latter provision may not disfranchise illiterate white men it is provided that the test shall not apply to those descended from soldiers enlisted in any war.

GRAND FORKS, N. D., the second city in size in the state, the county seat of Grand Forks County, eighty miles north of Fargo, on the Red River of the North and on the Northern Pacific and the Great Northern railroads. This city is in an agricultural and lumbering region and has manufactures of flour, sugar, lumber and foundry products, and other articles. There is also a large trade in live stock and farm produce, and the city has a number of large creameries. It is the seat of the University of North Dakota, Wesley College, the Lutheran Bible School, and two business colleges. The city has a Federal building, a Carnegie Library and three hospitals. There is an airport. The place was settled in 1871, and incorporated in 1881. Population, 1930, 17,112.

GRAND ISLAND, NEB., the county seat of Hall County, 153 miles west of Omaha, on the Union Pacific and the Chicago, Burlington & Quincy railroads. There are daily flying stops at the airport. The city is in a fertile agricultural region; it has an extensive grain trade, and the other industries include railroad shops, flour mills and beet-sugar, canning and broom factories. The Nebraska Soldiers' and Sailors' Home is located here, and there is a Carnegie Library and a Catholic cathedral. The place was settled in 1869, and was incorporated three years later. Population, 1920, 13,960; in 1930, 18,041.

GRAND JURY. See JURY AND TRIAL BY JURY.

GRAND PRE, *grahN pra'* a beautiful village in Kings County, Nova Scotia, near

Minas Basin. The French settlers there were expelled by order of the English in 1713. It is of this incident that Longfellow's *Evangeline* tells, though not with historical accuracy.

GRAND RAPIDS, MICH., the second city in size in the state and the county seat of Kent County, thirty miles east of Lake Michigan and sixty miles west by north of Lansing, the capital city. It is on the Grand River and on five railroads—two lines of the New York Central System, the Grand Trunk, the Pere Marquette and the Grand Rapids & Indiana. Grand Rapids has an airport of the first class. For many years the city was first in the world in the manufacture of furniture. It is now third, New York and Chicago exceeding it in output. The furniture business of Grand Rapids employs 10,000 people, and the product is worth a million dollars a month at the factories. There is a vast range of other manufacturing interests, including the making of machinery, hosiery and knit goods, clothing, tobacco and cigars. Large gypsum deposits nearby furnish raw material for the manufacture of plaster. Sectional book cases were first made here, and the industry is important.

Among the buildings of importance which have been constructed are a Masonic Temple (\$50,000); a Y. M. C. A. (\$300,000); a large hotel (\$2,000,000), a Civic Auditorium. The Federal building is an imposing structure which cost \$375,000. There are now six banks, the large Ryerson Library and four hospitals. It is claimed that Grand Rapids is the second city in the United States in proportion to population in the number of homes owned by occupants.

The region around Grand Rapids is devoted to agriculture and fruit growing. The Grand River here has a fall of about eighteen feet and furnishes considerable water power for manufacturing. The city was settled in 1833 on the site of an abandoned Indian village, and was chartered in 1850. Population, 1920, 137,634; in 1930, 168,592, a gain of 22.5 per cent.

GRAND REMONSTRANCE, the name given to the document in which the English House of Commons presented to Charles I a statement of the grievances which they had against him. It enumerated all the illegalities of his government, such as the levying of forced loans and the abuses of the courts of

Star Chamber and High Commission. Charles attempted to put off the subject with an evasive answer. The insistence of the House on the Grand Remonstrance was the immediate cause of Charles's attempt to arrest five members of Parliament, which in its turn was one of the causes of the civil war in England.

GRANITE, *gran'it*, an igneous rock, or rock formed by the action of intense heat during the formation period of the earth. It is generally composed of quartz, feldspar and mica, mixed without any regular arrangement of the crystals. The grains vary in size from that of a pin's head to : mass of two or three feet in diameter, but they seldom exceed the size of a large pea. When the grains are of this size or larger, the granite is said to be coarse-grained. Granite varies in color from almost white to black and from light pink to dark red. This variation is due to the different proportions of feldspar and to the different colors which that mineral takes.

Granite is one of the most abundant of the igneous rocks, and that seen upon the surface of the earth was thrown into its present position by the convulsions of the earth's crust. Most of the granite is of very early formation, but some varieties are of a later period. Granite is very hard, strong and durable and is one of the most valuable building stones. Its length of life, in excellent condition, is from seventy-five to 200 years. It can be worked into any form, receives a high polish and withstands the weather well. The most extensive granite works in the United States are in Maine, New Hampshire, Vermont, Massachusetts and Minnesota; other states producing it are California, Colorado, Wisconsin and Wyoming. In Canada it is quarried in Nova Scotia, Quebec and British Columbia.

Syenite is a variety of granite in which the mica is replaced by hornblende. It is often stronger and more durable than granite, and much of the granite of commerce is syenite, or syenitic gneiss.

Related Articles. Consult the following titles for additional information:
 Building Stone Igneous Rock
 Geology Gneiss

GRANITE CITY, ILL., founded in 1892, is a manufacturing town of importance in Madison County, opposite Saint Louis, Mo., on the Mississippi River. It is on the Chicago & Alton, the Wabash and other rail-

roads and the Merchants' Bridge Terminal. Its manufactured products are iron and steel, tin plate and granite ware, and there are bridge works and a corn-products refinery. Population, 1920, 14,757; in 1930, 25,130.

GRANT, FREDERICK DENT (1850-1912), an American soldier, son of Ulysses S. Grant, was born at Saint Louis, Mo. He was graduated at West Point in 1871, and became lieutenant-colonel in the United States army, but resigned in 1881. Afterwards he was minister of the United States to Austria, and still later he was police commissioner of New York City. In the Spanish-American War Grant was appointed brigadier-general of volunteers and for a time was in command in Porto Rico. He was transferred to the Philippines, where he performed notable service, in both civil and military capacities. In 1901 he was appointed brigadier-general in the regular army and became commander, successively, of the departments of Texas, of the Lakes and of the East.

GRANT, GEORGE MONRO (1835-1902), a Presbyterian clergyman and educator, born at Albion Mines, Nova Scotia, and educated at Pictou Academy, West River Seminary and the University of Glasgow. He returned to Nova Scotia in 1860 and in 1863 became pastor of St. Mathew's Church, Halifax, where he remained for fourteen years. In 1877 he became principal of Queen's University, Kingston, which through his influence expanded from a small denominational college into a large and influential educational center. During his incumbency of this office he succeeded in raising \$250,000 as an endowment fund for the institution. He was the author of *Ocean to Ocean*, *New Year's Sermons*, *Our Five Foreign Missions* and *National Objects and Aims*. Dr. Grant was one of the leaders of opinion in Canada, and used his influence in the interests of public education and in developing sentiment for a united Canada. In his later years he was a vigorous advocate of imperialism.

GRANT, ROBERT (1852-), an American writer and jurist, the author of several thoughtful novels and philosophical essays. He was born in Boston, and was graduated in law at Harvard College. Grant began to practice law in Boston in 1879, and has continued to reside there. In 1893 he was appointed judge of the Probate Court and of the Court of Insolvency for Suffolk County,

Mass., and since 1895 he has also served as an overseer of Harvard University. In 1883 he married a daughter of Sir Alexander Galt of Montreal. Judge Grant's most widely read novel is *Unleavened Bread*, a problem story published in 1900. Other works include *The Undercurrent*, *The Chippendales*, *Convictions of a Grandfather*, *The High Priestess and Their Spirit*. *The Opinions of a Philosopher* and *The Art of Living* are volumes of essays.



GRANT, ULYSSES SIMPSON (1822-1885), an American military leader and statesman, the eighteenth President of the United States. Grant was twice elected to the highest office within the gift of the American people, and their bestowal of this honor was in recognition of the great service he had rendered the Union at a critical period of the Civil War.

"I propose to fight it out on this line, if it takes all summer," he had telegraphed from the field of Spottsylvania, a few weeks after he took chief command of the armies of the North. These words furnish the keynote of his character as a soldier—unyielding persistence and determination. Through the exercise of these qualities he brought the war to a victorious close and saved the Union.

Ancestry and Education. Grant was born at Point Pleasant, Clermont County, Ohio, on April 27, 1822. He came of Scotch ancestry, and the first of the family was one of the original settlers of Dorchester, Mass. Jesse Grant, the father of the future President, was engaged in the tanning business at Point Pleasant when his son was born. A year later he moved to Georgetown, forty miles northeast of Cincinnati, and there Ulysses passed his boyhood. When the lad was seventeen an appointment to West Point was secured for him, and at that time he was enrolled as Ulysses Simpson Grant, though he had been christened Hiram Ulysses. The error came about in this way: The Congressman who made the appointment thought that Ulysses was the youth's first name, as he had never used the name Hiram. He also made a guess that Simpson, the

mother's maiden name, was the middle name. Ulysses Simpson Grant was therefore entered on the rolls, and the entry was never changed.

Military Career. Grant made a creditable though not a distinguished record at West Point, graduating in 1843 the twenty-first in a class of thirty-nine. After his graduation he served during the Mexican War, taking part in every important battle except Buena Vista and being brevetted captain for gallantry. In 1854 he resigned his commission and engaged first in farming and the real estate



ULYSSES SIMPSON
GRANT

business near Saint Louis, without success. He then went to Galena, Ill., where he became a clerk in his father's leather store.

On the declaration of war, in 1861, he offered his services to the Union, but received no reply and was chosen captain of a company of volunteers. He was soon promoted to a brigadier-generalship of volunteers. He seized Paducah, completed preparations for the navigation of the Tennessee and the Ohio, blocked the departure of reinforcements from Belmont, captured Fort Henry and Fort Donelson and won the two days' Battle of Shiloh. He then gained a new victory at Iuka and, after repulsing the Confederates before Corinth, commenced operations against Vicksburg. After a siege of some months, in the course of which he took the town of Jackson and scattered an army under Johnston, Vicksburg surrendered. For this Grant was made major-general in the regular army and was placed in command of the Mississippi division. After the defeat of Rosecrans at Chickamauga, he directed the great Battles of Chattanooga.

At Fort Donelson Grant had replied to the Confederate general's suggestion for an armistice to arrange details of surrender with the words, "No terms other than unconditional and immediate surrender can be accepted. I propose to move immediately upon your works." This remarkable statement won him the name "Unconditional Surrender" Grant, and made a profound impression

Administration of Ulysses Simpson Grant, 1869-1877

I. THE PRESIDENT

- (1) Birth
- (2) Education
- (3) Early career
- (4) In the Civil War
- (5) Character
- (6) Death

- (b) Sioux and Modoc Indian uprisings
- (c) Chicago Fire
- (d) Bell telephone patented
- (e) Death of Charles Sumner, 1874
- (f) Union Pacific, first railroad to California, finished
- (g) Centennial Exposition, Philadelphia

II. DOMESTIC AFFAIRS

- (1) Governmental
 - (a) Reconstruction
 - (1) Fifteenth Amendment
 - (2) Force Acts
 - (a) To protect the negro in his new rights
 - (b) Gave President power to suppress insurrections
 - (c) Wider jurisdiction granted to the courts
 - (3) President's intervention in local affairs of the South
 - (b) Important laws
 - (1) Civil Service Act, 1871
 - (2) Financial legislation
 - (a) Coinage Act of 1873
 - (b) Resumption Act of 1875
- (2) Political corruption in national and local government
 - (a) Credit Mobilier
 - (b) The whisky ring
 - (c) Impeachment of Belknap
 - (d) The "Salary Grab" Act
 - (e) Tweed Ring
- (3) Panic of 1873
 - (a) Causes
 - (1) Undue railroad expansion
 - (2) Over-activity in other industries
 - (3) Lack of capital necessitated large loans
 - (b) Effect on business and industry
- (4) Other important events
 - (a) Election of 1872

- (5) Election of 1876
 - (a) Issues
 - (b) Electoral Commission
 - (c) Hayes declared elected

III. FOREIGN AFFAIRS

- (1) Alabama claims
 - (a) Treaty of Washington
 - (b) Geneva award
- (2) Boundary disputes
 - (a) Northwest boundary settled
 - (b) Atlantic fisheries
- (3) Virginia affair

Questions on Grant

- When and where was Grant born?
 Where was he educated?
 What military experience had he had before the Civil War?
 Name five important battles in the Civil War in which Grant took part.
 What did he do at the end of his term as President?
 Where is Grant's tomb?
 What important writing did he complete before he died?
 What was the purpose of the fifteenth Amendment?
 What did it provide?
 What is meant by "Force Acts"?
 Why were they passed? With what effect?
 On what principle is the Civil Service system based?
 When was the first Civil Service Act passed?
 What was the "crime against silver"?
 When was the Resumption Act passed?
 What was the "Credit Mobilier"?
 What was the Whisky Ring?
 What was the "salary grab"?
 What were the causes of the panic of 1873?

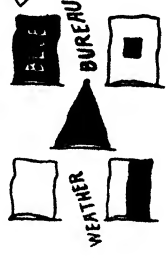
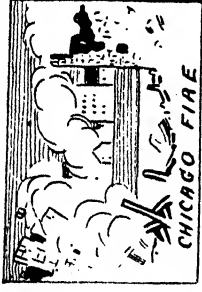
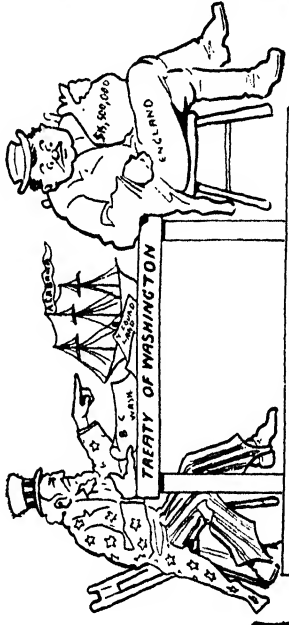
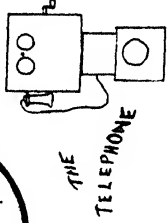
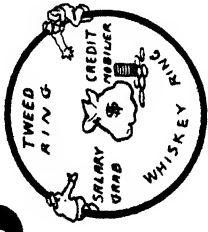
1869

1877

UNCONDITIONAL SURRENDER

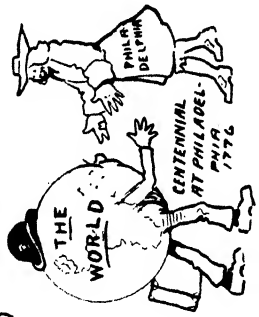
LET US HAVE PEACE

GRANT'S ADMINISTRATION



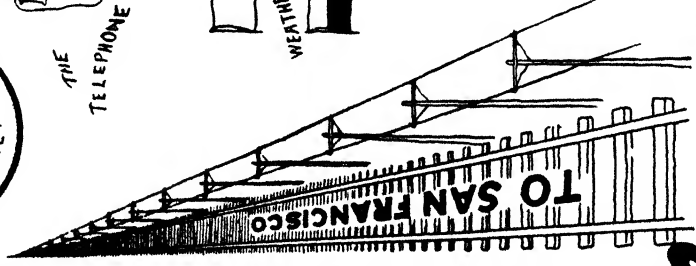
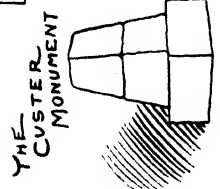
OTHER EVENTS

- ANTICIPATION OF THE FIFTEENTH AMENDMENT
- THE FENIAN EXCITEMENT
- THE GENEVA ARBITRATION
- THE KU-KLUX INVESTIGATION
- PANIC OF 1873
- THE JOINT ELECTORAL COMMISSION



MODOC WAR

SIOUX INDIAN WAR



upon the people who were watching the career of this uncompromising man. Though he later had trouble with General Halleck, his superior officer, his services in connection with the Vicksburg and Chattanooga campaigns convinced Lincoln that this was the man he was looking for to lead the Union armies, and in March, 1864, Grant was appointed lieutenant-general and assumed command of all the armies of the United States. He planned a simultaneous movement upon the part of the eastern and western Union armies, which resulted in the overthrow of the Confederacy. He himself, in a succession of hotly contested battle: at the Wilderness, Spottsylvania, North Anna and Cold Harbor, steadily advanced on Petersburg and Richmond. After a siege of many months, these fell, and Lee, defeated at Five Forks and completely surrounded, surrendered to Grant, April 9, 1865.

A few days after Lee's surrender, North and South were plunged into mourning over news of the assassination of Lincoln. It was Grant who took the President's place in the hearts of the Northern people, and the Congressional act (1866) promoting him to full general was widely approved. Though not interested in politics, Grant was forced to take sides in the dispute between President Johnson and Congress, and he incurred Johnson's severe displeasure by turning back to Stanton the office of Secretary of War when Congress refused to confirm Stanton's dismissal. Grant himself had held the office during the interim. His popularity made him the most conspicuous man considered for the Presidency, and in 1868 he was unanimously chosen as the Republican candidate. In the election, Grant and Schuyler Colfax, candidate for Vice-President, won by 214 electoral votes.

Career as President. Grant carried out the reconstruction policies authorized by Congress, and the Southern states were under local self-government by 1870. In that year the necessary number of states ratified the Fifteenth Amendment, guaranteeing suffrage to citizens regardless of race. The Amnesty Act, restoring civil rights in the South, was passed in 1872. Important in the field of foreign relations was the settlement of the *Alabama* claims. Grant was nominated for a second term in 1872, and with Henry Wilson was easily elected, in spite of a split in the Republican party. His sec-

ond term was notable for the abolition of the bimetallic system by the coinage act of 1873; and for the act providing for the resumption of specie payments. This term was marked by grave financial scandals, which involved several of Grant's political appointees, but not Grant himself personally.

Later Life and Character. On his retirement he spent some time in travel, making a trip around the world. Later, he became involved in a company which exploited his name, failed and left him heavily in debt. He endeavored to repair his fortune by writing and publishing his *Memoirs*, which he completed, after a heroic struggle, just before his death. The work was at once acclaimed as one of the most careful, complete and impartial descriptions of the Civil War, and it took high rank for its clearness, force and modesty as an autobiography.

As a man Grant endeared himself to all by his high ideals and unassuming manner. As President his natural generosity often led him into judgments of men which offset his own ability and honesty. But all in all, his was one of the most imposing personalities in American history.

Related Articles. Consult the following titles for additional information:

Alabama, The	Liberal Republican
Bimetallism	Party
Centennial Exposition	Reconstruction
Civil War in	Salary Grab
America	Specie Payments,
Credit Mobilier	Resumption of
	Washington, Treaty of

GRANULATION, in surgery, the formation of small, grainlike, fleshy bodies on the surfaces of ulcers and running wounds, serving both to fill up the cavities and to bring their sides nearer together and unite them. The color of healthy granulations is a deep, florid red. Unhealthy livid granulations sometimes appear, and these are known as *proud flesh*. Lumps or sores that form on the eyeballs or beneath the eyelids are also termed granulation. They, are, however, characteristic features of a disease known as *granular conjunctivitis*.

GRAPE, the fruit of a vine which grows both in the wild state and under cultivation, providing food for the people of nearly all countries. There are many varieties of both wild and cultivated grapes, and the vines are found in all continents. The grape has a woody stem, which climbs by attaching itself to supports by means of tendrils; it has a dark brown bark, resembling that of a tree.

The leaves are large, broad and deeply three-lobed. The blossoms are small and of a greenish color. The fruit grows in clusters, is spherical or oval and varies in size from one-fourth of an inch to an inch in diameter, while in color it may be green, yellow, red, purple or variegated. The interior is a soft pulp, containing two or five seeds, and the outer skin is tough and indigestible, but it contains an acid which in cooking adds flavor.

Wild grapes are propagated by seeds, but the cultivated varieties are propagated by cuttings or graftings (see GRAFTING). The methods of propagation, pruning and cultivating vary in different regions. The grape is extensively cultivated in Western Asia, the south of Europe and in certain portions of North America, particularly in New Jersey, Delaware, New York, Ohio, Michigan, in the southern part of Ontario and in the inter-mountain sections of California. Of the varieties grown in America, one of the best known is the Concord, so called because it was first grown at Concord, Mass. The grape vine lives for a long time, and in favorable climates it will produce for many years. The fruit is chiefly used for raisins and for the manufacture of wine, though most of the grapes grown in the United States east of the Mississippi River are placed on the market for table use.

The grape is supposed to be the oldest cultivated fruit, and it has been known to civilized nations from time immemorial. It is supposed that the Phoenicians introduced the plant into Europe, whence it spread to England. Grape culture in California was begun by the Spanish missionaries about 1771; from this beginning the industry there has attained its present proportions.

The most injurious enemy of the grape vine is an animal parasite called *phylloxera*.

Related Articles. Consult the following titles for additional information:

Phylloxera Raisin Wine

GRAPEFRUIT, a favorite citrus breakfast fruit, allied to the lemon and the orange. It is called grapefruit because the fruit grows in clusters, as do grapes. Each grapefruit is from four to seven inches in diameter, and weighs from one to four or five pounds. The pulp resembles that of the lemon, but is not so sour and is somewhat bitter. The flavor has been much improved through grafting.

Grapefruit, which is native to South-eastern Asia, has been cultivated in Amer-

ica for over three centuries. At first it was cultivated in Florida as an ornamental, but since 1900 it has received increasing attention from commercial fruit growers. Practically all of the American crop is grown in Florida, California, Texas and Arizona, with Florida producing two-thirds of the total output. Besides being a popular breakfast fruit, grapefruit is used in salads and desserts. Its juice contains the anti-scurvy Vitamin C.

GRAPHITE, *graf'ite*, a very soft metallic-appearing form of black carbon—of the same chemical composition as diamonds and coal. Because it leaves a mark on paper, it is popularly called *black lead*; *graphite* is from the Greek for "I write." *Plumbago*, from the Latin for *lead*, is another name for the mineral. In nature, it occurs in crystalline and non-crystalline, or amorphous, forms. It is also manufactured from coal in the electric furnace.

Graphite is found in a number of states, but the output of the mines does not keep pace with the industrial demands, and large quantities are imported from Ceylon, Mexico, Madagascar, Chosen and Canada. Finely pulverized graphite is the marking material in "lead" pencils. Because it will not melt under intense heat, crystalline graphite is valued as a material for crucibles in which steel and precious metals are fused, though the increasing use of the electric furnace has lessened the demand for crucible graphite. The mineral is also employed in making lubricants for chains and heavy machinery.

Graphite is a useful ingredient in stove polish because it forms a lustrous, protective coating. Mixed with linseed oil, it is used in paints for metal surfaces. Being moisture-proof, graphite is employed as a glazing substance for powder and shot, and as a dressing for felt hats. It is used in dry batteries and in electrotyping (which see). Manufactured graphite is widely used for electrodes and foundry facings.

GRAPHOPHONE, *graf'o fohn*. See TALKING MACHINE.

GRASSES, the common name of a very extensive and important family of plants, comprising about 250 genera and 4,700 species. To this family belong many of the plants which help to clothe, feed and house mankind. Among them are the cereals—corn, wheat, oats, rye, rice and barley; the sugar cane, source of one-third of the world's

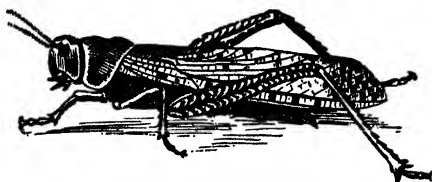
supply of sugar; the pasture grasses, which provide food for grazing animals; and the bamboo, indispensable to dwellers in the tropics. (The direct and indirect uses of all these plants are pointed out in the individual articles under their appropriate headings.)

Most of the grasses are small herbs, with narrow sheathing leaves, a conspicuous exception being the treelike bamboo, which has a woody stem. The flowers, which are small, are never showy, but they are often grouped in pretty and graceful clusters. The typical flower has three stamens, each with a long, delicate anther attached near the middle, so that it moves freely on its support, and a single pistil with a two- or three-branch stigma. These organs are surrounded by delicate bracts; several flowers are grouped into a spikelet, and these are in turn gathered into the racemes, panicles or heads which characterize the species.

Related Articles. Consult the following titles for additional information:

Bamboo	Foxtail Grass	Sorghum
Barley	Gama Grass	Sudan Grass
Blue Grass	Kafir Corn	Sugar Cane
Broom Corn	Millet	Sweet Flag
Cane	Oats	Timothy
Corn	Rice	Wheat
Esparto	Rye	

GRASS'HOPPER, the name of various short-lived, leaping insects which are nearly related to the locusts. They are characterized by long and slender legs, the thighs of the hinder legs being large and adapted for leaping, by large and delicate wings and by the peculiar wing covers, which extend far beyond the extremity of the abdomen. Grasshoppers form an extensive group of insects



GRASSHOPPER

and are distinguished by the power which they possess of leaping to a considerable distance and by the chirping noise the males produce by rubbing their wing covers together.

The eggs, one-fifth of an inch long, and about thirty in number from each female, are laid just below the surface of the ground in midsummer. They are protected by a sort of varnished film, in which all the eggs are enclosed. In the spring the eggs hatch. The young shed their skins four or five times be-

fore reaching maturity. The insects mate within ten days after maturity, eggs are laid usually twice during the life of the female, and within three or four weeks both males and females die.

The destructive insect known as the grasshopper in the United States is the Rocky Mountain locust, and the "locust" of this country is really the cicada.

Related Articles. Consult the following titles for additional information:

Cicada	Insect	Locust
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GRATZ, or **GRAZ**, *grah'ts*, founded in the ninth century, is an old town of the former Austro-Hungary, now capital of Styria, in Austria. It is picturesquely situated on the Mur, 140 miles southwest of Vienna. The Schlossberg, or citadel, rises 400 feet above the river, but the fortifications of the town have given place to avenues and pleasure grounds. A university, founded in 1586, has nearly 2,000 students in normal times, and a library of over 150,000 volumes. The Joanneum, for the promotion of agriculture and scientific education, has a large library and museums. Population, 1934, 152,625.

GRAVITATION, *gravi'ta'shun*. Every particle of matter in the universe attracts toward itself every other particle of matter. A piece of iron and a rock not far apart on the ground attract each other. They do not fly together, because there is a more powerful pull, or attraction, which affects both; each is pulled toward the center of the earth with a greater attraction than that which each exerts toward the other. A ball thrown into the air returns because of the earth's attraction. The ball is pulled toward the earth, but the earth is also pulled toward the ball; the earth's attraction is as many times greater than that of the ball as the mass of the earth is greater. The moon, being of less mass than the earth, would crash into our planet were it not held in its place by the attraction of other heavenly bodies. All the planets are thus held in their courses by perfectly-balanced forces.

The general laws of gravitation were discovered by Sir Isaac Newton (which see). It is said he was started on his investigations by observing an apple fall from its tree. He wondered what caused it to fall. Eventually he gave to the world a general law of gravitation, as follows:

Every portion of matter attracts every other portion of matter with a force directly

proportional to the product of their masses, and inversely proportional to the square of the distance between them.

Gravity denotes the attraction which the earth exerts on bodies on its surface. This attraction is least at the equator and greatest at the poles, since, owing to the form of the earth, bodies at the equator are a little farther from the center than at the poles. Furthermore, the rotation of the earth, being so rapid at the equator, has a tendency to throw bodies from the surface and thus to overcome in a measure the earth's attraction, while at the poles this tendency is not found. For the laws of gravity, see **FALLING BODIES**.

Center of Gravity, that point in a body from which or on which the body can be suspended or poised in equilibrium. A glass marble on a smooth surface will easily roll in any direction. The center of its weight is equally distant from all points on its surface; in other words, its center of gravity is in the exact center of the object. An object of irregular shape tends to turn until its center of weight is as low as it can possibly fall. A cone cannot be balanced on its vertex; a board will not stand on one end. Each will fall because the center of its weight pulls it down. A loaded wagon will overturn when a vertical line downward from its center of weight passes entirely outside the wagon.

GRAVITY, SPECIFIC, the relative weight or density of substances. Specific gravity is found by comparing the weight of a substance with the weight of an equal quantity of some other substance, taken as a standard. Water forms this standard for liquids and solids, and air is the standard for gases. There are three general rules for finding the specific gravity of substances:

(1) To find the specific gravity of a body heavier than water, attach the body to one arm of a balance or to a spring balance and weigh it in air; then weigh it suspended in water. Its loss of weight in water is equal to the weight of an equal volume of water. Subtract the weight in water from the weight in air and divide the weight in air by the difference. The result is the specific gravity.

(2) To find the specific gravity of a body lighter than water, weigh the body in air; then weigh a sinker in air, being sure that the sinker is heavy enough to immerse the light body. Weigh the sinker in water, and then weigh the two in water. From the loss of weight of the two bodies in water subtract the loss of weight of the sinker in water. The result will be the loss of the light body. Divide the weight of the light body by its

loss of weight in water, and the result is the specific gravity.

(3) To find the specific gravity of a liquid, use a specific gravity bottle, which holds a certain weight of water, as a thousand grains. Divide the weight of the liquid which the bottle contains by the weight of the water, and the result is the specific gravity. The specific gravity of liquids may also be found by the use of the hydrometer (which see).

The following table gives the specific gravities of eighteen common substances. Specific gravity is expressed as a numerical ratio. For example, that of aluminum is 2.7. Its density, or relation of mass to volume, is expressed as 2.7 grams per cubic centimeter.

Aluminum	2.56—2.67	Ice	0.917
Cast iron	7.0 —7.7	Lead	11.30
Copper	8.93	Mercury	13.595
Cork	0.22—0.26	Silver	10.57
Diamond	3.52	Tin	7.29
Ether	0.736	Turpentine	0.873
Gasoline	0.66—0.69	Water	1.000
Glass	2.4 —3.5	Wood alcohol	0.80
Gold	19.26—19.55	Zinc	7.10

See, also, **FLUID**, subhead *Mechanics of Fluids*.

GRAY, ASA (1810–1888), an American botanist, born at Paris Furnace, N. Y. After practicing medicine for some time, he became curator of the New York Lyceum of Natural History, then, in 1838, was appointed professor of natural history in the University of Michigan. Four years later he became professor of natural history in Harvard University and held that chair for thirty-one years. Gray was one of the ablest and the most philosophic of botanists and wrote many valuable books, among which are *Lessons in Botany*, *Elements of Botany*, *How Plants Grow*, besides other botanical textbooks. He was one of the first American scientists to advocate the theory of evolution, and set forth his theories in *Darwinia* and *Free Examination of Darwin's Treatise*. At the time of his death he was the leading American authority in the science of botany, and ranked with the greatest scientists of the world.

GRAY, ELISHA (1835–1900), an American inventor who disputed Alexander Bell's claim to being the inventor of the telephone. Gray was born at Barnesville, Ohio. He experimented in the construction of electrical machines and in 1867 took out his first patent. In 1876 he applied for a patent on a telephone, which was refused on the ground that Alexander Graham Bell had applied for a patent on a similar invention on the same day and was adjudged to have a prior claim. For

the next few years Gray was engaged in perfecting and patenting telegraph instruments and details of telegraphic structure. Among his inventions were a system of multiplex telegraphy, a type-printing telegraph and the telautograph, a form of writing- or copying-telegraph. See TELEGRAPH; TELEPHONE; TELAUTOGRAPH.

GRAY, GEORGE (1840-1925), an American jurist, born at New Castle, Del. He graduated at Princeton, studied law at Harvard and was admitted to the bar in 1863. He began practice at New Castle, but later removed to Wilmington. From 1879 to 1885 he was attorney-general of Delaware and in the latter year was elected United States Senator as a Democrat, serving until 1899, when he was made judge of the United States Circuit Court. He was a member of the Spanish-American peace commission of 1898 and of the joint high commission between Canada and the United States in the same year. He was also chosen a member of the permanent court of arbitration of the Hague Convention in 1900 and was chairman of the anthracite coal strike commission in 1902.

GRAY, THOMAS (1716-1771), an English poet, best known as the author of *Elegy Written in a Country Churchyard*, one of the most beautiful poems in the English language. In this and other poems Gray revealed himself as the forerunner of the great Romantic movement (see ROMANTICISM). He was born in London and educated at Eton and at Cambridge. Except for a three-years' sojourn in Italy with his friend Horace Walpole, son of the Prime Minister, he spent his life in Cambridge. The publication of the *Elegy* in 1750 brought him fame. In 1757 he declined an offer of the laureateship, and in the same year published his odes *The Progress of Poesy* and *The Bard*, the latter considered one of the epoch-making poems of English literature. Works which introduced to English readers the romantic beauty of Norse folk tales were *The Fatal Sisters* and *The Descent of Odin*. Gray was a delightful letter-writer, and he wrote admirable Latin verse.

GRAYLING, a family of fishes related to the salmon. Graylings are more slender, however, have larger scales and are more graceful and active, resembling the trout in their habits. They are fine game fish, and their flesh is considered a great delicacy. The common European species is found in

Scandinavia, Russia, the Orkney Islands and as far south as Switzerland. The largest specimens weigh four or five pounds. There



GRAYLING

are three American species, found only in Arctic streams and in Michigan and Montana. They never exceed a length of eighteen inches. The graylings of Michigan are being exterminated by the brown trout, their natural enemy.

GRAZ, grahtz. See GRATZ.

GREAT BEAR, in astronomy. See BEAR, GREAT.

GREAT BEAR LAKE, the largest lake of Canada, 11,821 square miles in extent—five times as large as Prince Edward Island and almost as large as the state of Maryland. It is larger than that portion of Lake Superior belonging to Canada. This great body of water lies far to the north, in North West Territories, the Arctic Circle crossing its northern section. Its waters are only about 200 feet above sea level, and they reach the Arctic Ocean through the Great Bear and Mackenzie rivers. The lake is frozen over for seven to nine months of every year.



GREAT BRITAIN, *brit'n*, an island mass off the northwestern coast of Europe, the largest island belonging to that continent, and from a political standpoint the most important on the globe. It comprises Scotland, England and Wales. Separated from Ireland by the Irish Sea and Saint George's Channel, Great Britain forms with Northern Ireland what is now known as the Kingdom of Great Britain and Northern Ireland. The United Kingdom and various

groups of outlying islands comprise the British Isles (which see). Often the name Great

Britain is used to designate England and even the British Empire, of which the island is the nucleus. This article treats of the island Great Britain as a whole, and in reading it one should consult also the separate articles on Scotland, England, Wales, Ireland and the British Empire. (See map of Great Britain, in article EUROPE).

Size, Population and Location. Great Britain has an area of 88,745 square miles, ranking seventh among the islands of the world. It exceeds in size the state of Minnesota by a little more than 2,000 square miles, and is about one-third the size of Texas. England, Scotland and Wales divide the whole area as follows: England, 50,874 square miles; Wales, 7,466; Scotland, 30,405. The island has a maximum length of about 600 miles; in the extreme south, where the widest part is found, it is about 320 miles across. The narrowest portion, between the firths of Clyde and Forth, is only thirty-two miles in width. The combined population of the three units of the island in 1931 was 44,937,444. Scotland is least densely populated, but in England and Wales there are 685 people to each square mile.

Great Britain lies between the fiftieth and fifty-ninth parallels of north latitude and is separated from the continent of Europe by the North Sea, the English Channel and the Strait of Dover. The coast line is very irregular and contains many deep indentations, having a total extent of 4,000 miles, or one mile for every twenty square miles of area. It is an interesting fact that Great Britain lies in the center of the great land masses of the globe, and London, the capital, is the geographical as well as the political center of the world's greatest empire.

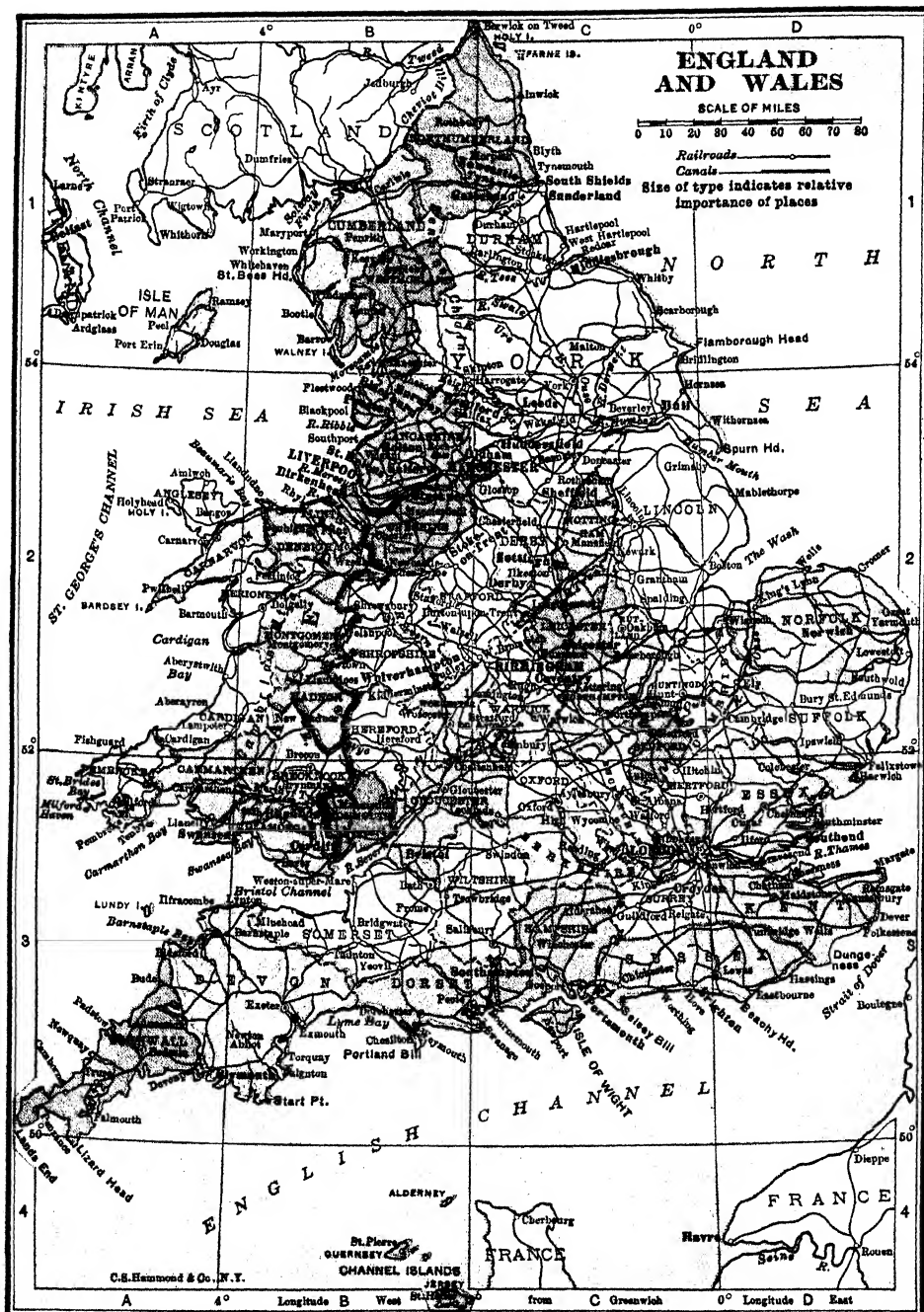
Surface and Drainage. The surface of Great Britain is divided into four well-defined regions: (1) the highland region of the north, which is separated from the lowlands, to the southeast, by an irregular line, drawn from the mouth of the Clyde around Loch Lomond to the mouth of the Dee and separating the Grampian Mountains, which form the principal group in the highlands, from the South Grampians; (2) a region of lowlands to the southeast of this line, extending to the ranges of mountains in the southern portion of Scotland; (3) the mountain region, extending from the southern part of Scotland through the northern and western part of England and into Wales, this region contain-

ing a number of low mountain ranges, whose greatest height does not exceed 2,600 feet, including the Cheviot Hills, which form a large portion of the boundary between England and Scotland; (4) the lowlands or plains occupying the southeastern portion of the island and including the greater part of the surface of England. None of the mountains of Great Britain is high, and the highest peak, Ben Nevis, to the west of the center of Scotland, has an altitude of only 4,406 feet.

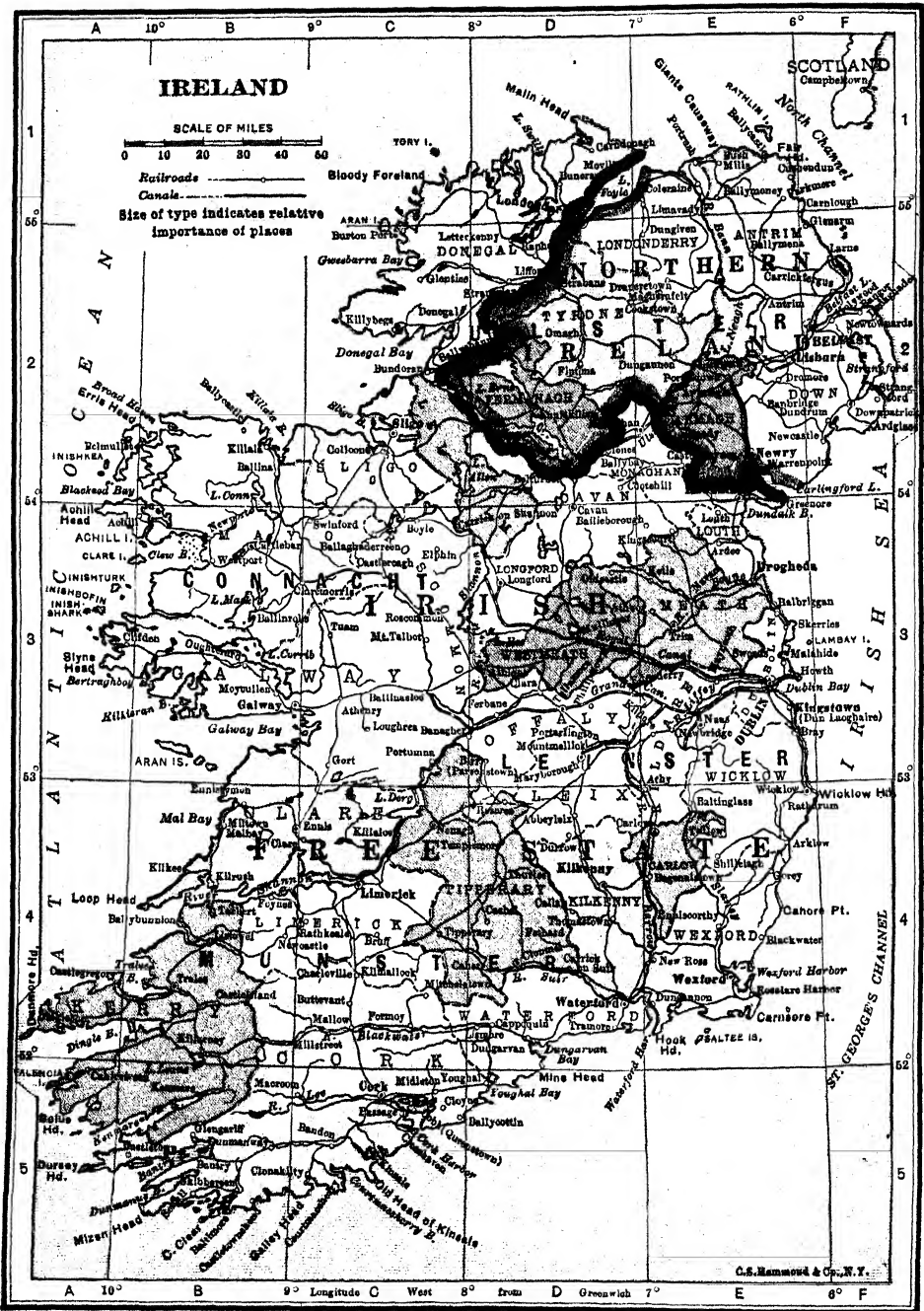
Because of the area of the island and the numerous mountain ranges, there are no rivers of great length or volume. The two largest streams are the Clyde and the Severn, each of which flows through a longitudinal valley for some distance before reaching the sea. Because of the basins drained, these streams acquire considerable volume. The most important rivers entering the sea upon the east are the Spey, the Don, the Dee, the Tay, the Forth, the Tweed, the Tyne, the Trent and the Thames. The last is commercially of great importance, since it has been made navigable by dredging and is the waterway which affords an outlet to the commerce of London. In the mountain regions in the north are numerous small, clear lakes, noted for their beauty and for the purity of their water. Among these are Loch Lomond, Loch Katrine and Loch Rannoch.

Climate. If Great Britain were placed alongside of North America, in corresponding latitude, it would extend from the northern shore of the Gulf of Saint Lawrence almost to the southern extremity of Greenland; yet, notwithstanding its latitude, the island has a mild, temperate climate, the average temperature for the year being about 48°. July is the warmest month, with an average temperature in London of 64°, and January is the coldest month. During the summer the mean temperature varies considerably from north to south, being a number of degrees lower in Northern Scotland than in Southern England; but in winter the change in temperature occurs from east to west, the temperature rising as one proceeds westward. In general, the rainfall is heaviest on the west coast and on the islands lying to the west of the main island, where the average is about forty inches per year, very uniformly distributed. In certain localities in Great Britain, especially the western slope of the Scottish highlands, it is nearly double this amount. In Wales and Cornwall it ex-









ceeds sixty inches, but along the east coast it seldom reaches thirty inches. The island is subject to dense fogs and many dull, cloudy days, in great cities rendered darker by smoke and soot.

This peculiarity of climate is due to the influence of the warm waters in the Atlantic. The warm drift, which starts off the east coast of North America as the Gulf Stream (see GULF STREAM), raises the temperature of the air which strikes Great Britain as a southwest wind. Since this wind blows during the greater part of the year, it gives to the island a mild and equable climate. During the winter months the coldest weather is produced by the north and northeast winds, which at this season of the year are more frequent than at any other time.

Vegetation and Animals. See EUROPE, subheads *Vegetation* and *Animal Life*.

Industries. The chief industries of Great Britain are agriculture, manufacturing, mining and commerce. For each of these the island is especially adapted by its geographical conditions. The mild and equable climate, with abundance of moisture, affords excellent conditions for agriculture. The war years of 1914-1918 greatly increased farming, for largely the people had to be fed through their own efforts. This added acreage has been to a great extent maintained since then, and about 30,000,000 acres are under intensive cultivation every year. Iron and coal are found in the highland districts in large quantities, and it is to the presence of these minerals that Great Britain owes its prominence as a manufacturing and commercial nation. Tin has been mined in Cornwall for centuries, and that locality is still an important source of supply. The leading industry is manufacturing. This employs a larger number of people than any of the other industries, although 835,000 people get their living from 2,400 coal mines. First in importance in manufactures are textiles; Great Britain is second only to the United States in the production of cotton and woolen goods. Next in importance are iron and steel and all of the products arising from them. For detailed accounts, see ENGLAND and SCOTLAND.

Transportation and Commerce. Throughout the island there are excellent highways, some of which were built in the days of the Romans. All of the principal towns are connected by railway lines, which are constructed and operated upon the most ap-

proved plans. In Great Britain are 20,300 miles of railways, grouped in four large systems, of which the Midland is the longest (7,464 miles). Electric lines and busses also furnish intercity communication. The principal canals, which are secondary in importance to the railroads, are the Manchester Ship Canal and the Caledonian Canal, each of which is described under its title. Many of the rivers have also been canalized, so that they afford water communication between the inland towns and the sea. None of the manufacturing or commercial centers is more than seventy-five miles from the sea, and most of them are much nearer, while many are situated on waterways. These local advantages, combined with the extensive manufacturing industries and the position of Great Britain among the land masses of the world, have made it the commercial and carrying nation. Trade has also been increased by the numerous colonies of the British Empire, with which special trade relations are maintained. The British merchant marine at the outbreak of the World War was the largest in the world, and much of the world's commerce was being carried in British holds. In spite of great losses through submarines during the war, Great Britain maintained its supremacy; it can be outranked in the future only by the United States, but because of governmental policy in America this seems improbable.

Since the eighteenth century, Britain has been attaining increased commercial importance; it once led all countries in total of foreign commerce; its nearest important rival is the United States. Normally, Britain's foreign trade is about \$6,000,000,000 a year, one-third exports and two-thirds imports. Manufactured articles and coal are the chief exports; foodstuffs and raw materials are the principal imports. A traditional national policy of free trade, with only a few customs duties, is gradually being weakened by demands for protective tariffs.

Religion. The Church of England is the established church in England, and the Presbyterian, or Church of Scotland, in Scotland. All other religions, however, are tolerated without opposition, and the Roman Catholic Church and leading Protestant denominations have large followings. See ENGLAND, CHURCH OF.

Education. See subheads in ENGLAND, SCOTLAND, IRELAND.

Army and Navy. See subhead *Great Britain*, under the heading **ARMY AND NAVY**.

Government. Central. The government of Great Britain is a constitutional hereditary monarchy. Its constitution, however, is not a single written instrument, but consists of all the laws of Parliament, all royal decrees establishing forms or principles of administration, a number of important agreements, several treaties, by which the relations of the parts of the United Kingdom to one another are regulated, and a vast mass of precedents and judicial decisions. Of all these, five instruments are, perhaps, of the greatest importance: the Magna Charta, given by King John in 1215; the Declaration of Rights in 1689; the Act of Settlement in 1701; the Act of Union with Scotland in 1707; the Act of Union with Ireland in 1800. The constitution obviously may be changed in a great number of ways; and, in fact, it is constantly changing.

The *executive* power is nominally vested in the Crown. This descends to the eldest child of the preceding ruler, male heirs being preferred over female heirs. The heir to the throne is admitted to full possession of his titles at the age of eighteen, when he becomes, by heredity, Duke of Cornwall, and by grant, Prince of Wales. The ruler must be a communicant of the Established, or Episcopal, Church. The Crown has all powers not expressly forbidden to it by Parliament. Thus, it may appoint and remove a vast number of administrative officers; it has command of the army, with the power of appointment and removal, is the nominal head of the Church, and presides over the highest ecclesiastical bodies, has the power of granting pardon and of issuing passports. The ruler may also summon, open, prorogue and dissolve Parliament, though the last step is never taken except with the advice of his Ministry. He also has the nominal power of vetoing the legislation of Parliament, but this right has not been used since 1707.

Theoretically, the king has much power; in practice, his rights are severely limited, but he can wield great influence. In a hundred years the sovereign has not exercised the veto power, so completely are his prerogatives controlled by the Cabinet, the real governing body, and the House of Commons.

The *Ministry* known as the *Cabinet*, is entirely an extra-legal body, but it is nevertheless, the most important factor in the gov-

ernment. It is formed as follows: The king asks the leader of the majority party in the House of Commons to become Premier and to select a Ministry. This leader, after consultation with his party colleagues, names a number of them whom he wishes to be appointed to the important Cabinet positions. The king promptly appoints them. The members of this Ministry may be members of either house of Parliament, but if they have seats in the House of Commons they must resign and come before their constituents for reelection; however, this is usually a mere formality. The members of the Ministry not only have seats in Parliament, with full privileges, but they initiate practically every important measure of legislation and lead in the debates. If defeated on an important policy, the Cabinet resigns. If the members believe that the people will uphold them, they may request the king to order a new election; if defeated by the electorate, however, they must resign unconditionally.

For the members of the Cabinet see the article **CABINET**, subhead *The British Cabinet*. The number varies from time to time; four new departments were added during the World War for special purposes. They were the ministries of munitions, air, blockade and reconstruction.

The *legislative* branch of the government consists of two houses, the House of Lords and the House of Commons. All bills relating to taxation and appropriations must originate in the House of Commons; and every law requires the assent of both. The Parliament Act of 1911, however, provided that a bill which has passed, without change, three readings in three successive sessions of the Commons may become a law without the assent of the Lords. Each term of Parliament extends over five years, unless the body is sooner dissolved. The upper house consists of representatives of two estates, the lords spiritual and the lords temporal. Of the former, the archbishops of Canterbury and of York and twenty-four principal bishops are admitted. Of the lords temporal, there are about five hundred hereditary English peers, which have been created by the Crown. This number may be increased without limit by the sovereign. Besides these there are sixteen Scottish peers, chosen by the whole body of Scottish peers to represent them during a term of Parliament; formerly twenty-eight Irish peers were chosen for life

The Government of Great Britain

Electorate:

Men and women, 21 years of age, residents for six months of England, Wales, Scotland, or Northern Ireland, elect members of the House of Commons.

King:

Hereditary. Succession determined by Parliament since 1701. Functions almost entirely ceremonial.

PARLIAMENT

Consists of two bodies, the House of Commons, and the House of Lords.

House of Commons:

615 members. Five year term. Legally supreme except for two year suspensory veto by Lords on non-financial bills. May dismiss Cabinet by resolution or by defeating its legislation.

House of Lords:

Approximately 750 members. Princes, representative Anglican Bishops, Scottish and Irish Peers, Law Lords, new members named by King on recommendation of Cabinet.

Privy Council:

Honorary group, whose name gives authority to Cabinet acts, etc.

Prime Minister:

Named by majority party in Commons, appointed by King. Leader of Cabinet, usually also First Lord of the Treasury.

Law Lords:

Jurists appointed for life. Lord Chancellor presides.

The Cabinet:

Members of Commons or Lords. Selected by Prime Minister. Responsible to Parliament. Chief members: Chancellor of the Exchequer, First Lord of the Admiralty, Secretary of State for Home Affairs, Secretary of State for Foreign Affairs, Secretary of State for Colonies, Secretary for Dominions, Secretary for India, Lord Chancellor, etc. The Cabinet is also assisted by a number of Ministers, not of Cabinet rank.

Lower Courts:

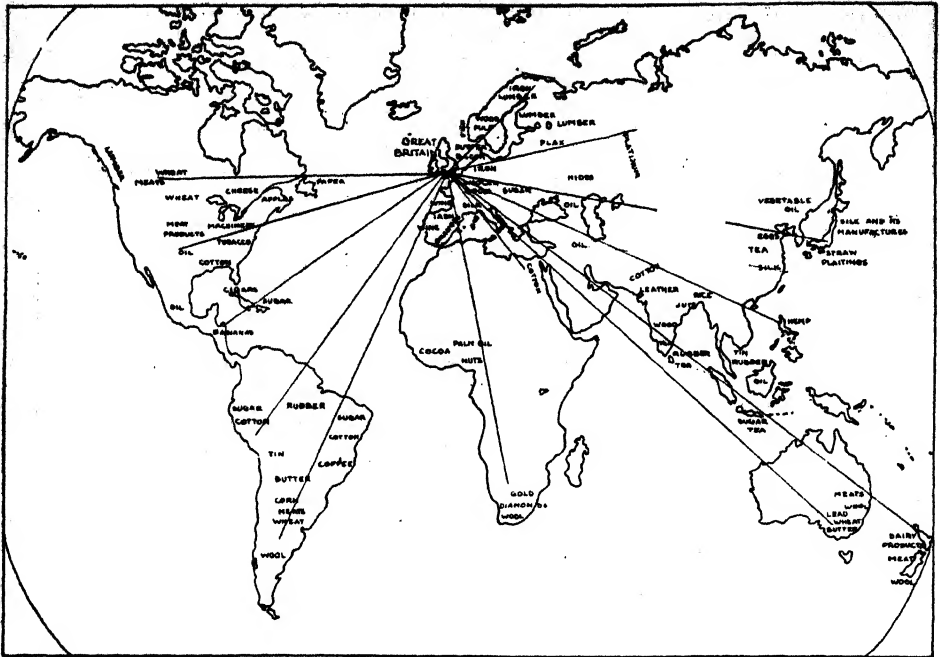
Court of Criminal Appeal, King's Bench, Chancery (Equity), Probate, Divorce and Admiralty, County Courts, Quarter Sessions, Petty Sessions, Justices of the Peace.

The Permanent Civil Service:

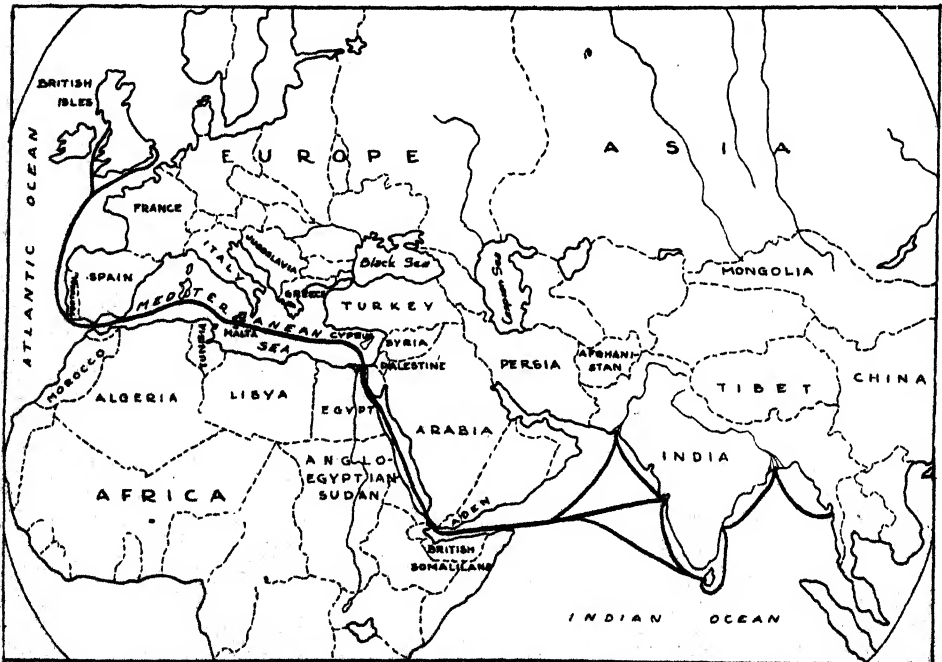
Selected by examination. Maintain tenure independent of changing ministries. Legally responsible to ministers; actually responsible for entire administrative work of government.

Local Government

The Parliament and Ministry have legislative and administrative supervision. In the Counties, over elections, justice and militia; the County Boroughs (cities over 50,000) are independent of the County. The City of London has a special government.



Great Britain's Principal Sources of Raw Material



Along the Trade Route to India



by the whole body of Irish peers. There are four judicial members, chosen from the privy council. The whole body is presided over by the Lord High Chancellor. The House of Commons consists of 615 members, chosen by popular vote. In 1917-1918 Parliament passed a law granting suffrage to women who were thirty years of age, and could meet the qualifications required of men. There is to-day in Great Britain almost universal suffrage. Late in 1918 the House of Commons passed a bill granting women the right to sit in Parliament.

Members of the House of Commons are chosen by districts, one representative being admitted for each 70,000 inhabitants. There are also a few representatives of towns and of the great universities. Members of Parliament need not be residents of the districts from which they are elected.

The House of Lords is the highest *judicial* body in the United Kingdom. It not only has original jurisdiction in certain instances, but it is the highest court of appeal for England, Scotland and Northern Ireland. In hearing appeals, only the Lord Chancellor, the five judicial members and other members who have held high judicial positions are allowed to take part. There is also a judicial committee of the privy council, consisting, however, of about the same personnel as the House of Lords when sitting as a court of appeal. This committee hears appeals from the colonies and possessions. Besides these two courts, there is a high court of justice, which consists of three divisions, the chancery division, the king's bench division and the probate, divorce and admiralty division. Appeals lie from this court to a court of appeals consisting of eight judges. Criminal cases are within the jurisdiction of the justices of the peace and of so-called assize courts, held quarterly in certain towns by judges of the king's bench.

Local. Local government in England is extremely complex and in many respects unsystematic. By the acts of 1888 and 1894, however, the system has been somewhat simplified. There are six administrative units, namely, counties, boroughs, urban districts, rural districts, parishes and school districts. The officers of the *county* are a lord lieutenant, a sheriff, justices of the peace, a clerk and a coroner. The lord lieutenant represents the Crown; the sheriff and justices of the peace have duties similar to those of the same

officers in the United States. However, the justices also have a few administrative duties, such as the issuance of licenses and appointing overseers of the poor. Each county also has a county council, consisting of councilors and aldermen, the latter being selected by the former, usually from their own members. This body administers county property, selects minor officers, assesses taxes, manages roads, grants amusement licenses, controls the police and has other administrative duties. The counties are subdivided into *rural* and *urban districts*, each governed by a council elected by the assemblies of still smaller districts, or *parishes*, and has administration of the poor laws, health laws and some other ordinances.

The *parish* is governed by an assembly at which every voter has the right to vote. A rural parish having more than three hundred population also has a council, which has charge of charities, water supply and similar matters. The *borough* is an incorporated town; its officers are a mayor, aldermen and councilors, which together form the council. The councilors are elected by the taxpayers; the aldermen by the councilors, and the mayor by the whole council. The duties of these officers include all the important administrative functions. *London* is governed by a special provision of the Act of 1888, amended later, by which it was made into an administrative county, containing twenty-eight boroughs, each having the same officers as other boroughs (see LONDON). All phases of local government are supervised by a local government board, whose president is a member of the cabinet. It audits the accounts of all local authorities, institutes important local legislation and directs in a large measure the activities of local affairs.

Since 1536 Wales has been governed as a part of England. For the administration of Scotland and Ireland, see the subhead *Government* in the articles IRELAND and SCOTLAND.

History. Although with the accession of James VI of Scotland to the throne of England as James I, in 1603, the crowns of the two countries had been united, each had retained its own legislative body; but by 1707 the feeling had grown strong that the best interests of the two countries demanded a complete political union. In May of that year, therefore, they were united under the name of Great Britain. (For the history of

the two countries previous to the union, see ENGLAND, subhead *History*; SCOTLAND, subhead *History*.) For a time the union was not generally popular in Scotland, but gradually the realization grew that it was the best thing which could have happened.

Queen Anne died in 1714 and was succeeded by George I of the House of Hanover. Soon after his accession, risings occurred in the interests of the exiled Stuarts, whose cause the Tories had advocated with Anne, and the new Parliament found itself obliged to punish severely the leaders of these insurrections, which were easily put down. The Whig party, which came in with George, remained in power for almost fifty years. One of the first acts of the new Parliament was the passage of the Septennial Act, by which Parliament extended the term of its members in office to seven years. This arbitrary act was made possible by the fact that George I cared little for his English possessions, provided only the English were willing to support him in his plans on the Continent. This same indifference rendered possible the establishment of the first real Cabinet government under a Prime Minister. Walpole, although he did not assume the title, was in reality the first of the Premiers. In 1720 occurred the disastrous failure of the famous South Sea Company which involved thousands in its ruin and greatly embarrassed the British government. Walpole's signal financial ability worked some sort of order in this crisis, however.

George I died in 1727 and was succeeded by his son, George II. Walpole retained his supremacy, since George II, like his father, took no vital interest in affairs in England. Against his will Walpole was drawn by popular feeling in 1739 into a war with Spain, which brought no honor to England and much unjust blame to him. Three years later, however, he resigned rather than engage in the War of the Austrian Succession. His successor, Carteret, at once involved the country in the war, and, although Great Britain won some victories, it came out of the struggle with no permanent advantages. During this war another Stuart rising had occurred, headed by Charles Edward, known as the Young Pretender, and this proved more formidable than the earlier attempts. Charles Edward was defeated, however, at Culloden and was forced to flee from the country. William Pitt entered the Cabinet in 1756,

and his hostility to France led him to engage at once in the war against France which ended so fortunately for England in India and in America.

Meanwhile, before the close of the struggle with France, George II had died (1760) and had been succeeded by his grandson, George III. The new king adopted a different attitude toward English affairs and showed himself from the first determined to regain the royal prerogatives which had been lost by his two predecessors. As before the days of Walpole, the most important man in the Cabinet became the man who happened to be the greatest favorite with the king, and Pitt resigned in 1761 and was succeeded by Bute, who in his turn gave place to North. During the North Ministry, matters in America came to a crisis, and the result was the loss to England of much of the territory in North America. In the year which saw the close of this struggle (1783), the Younger Pitt was made Prime Minister, and until his death in 1806 he was at the head of affairs in England. In 1793 he declared war against France, not because of any harm which had been done to England, but simply because of his opposition to the fanatic republicanism of the French Revolution, and this war was prosecuted vigorously. The victory of Trafalgar established the English supremacy on the sea, and Wellington's defeat of the French in Spain and Portugal enabled England to obtain favorable terms at the Congress of Vienna.

During the war with France there had been an insurrection in Ireland, which was put down without great difficulty, and a war with the United States, which had ended somewhat less favorably than the struggle with France. These wars had increased enormously the national debt of England, and the distress was great among the lower classes. Most severe measures were taken to suppress the discontent of the working classes, but by the time of the death of George III in 1820 it had become apparent that matters could not be amended without radical governmental reforms. Thus, when in 1822 George Canning became a member of the Cabinet of George IV as foreign minister, he turned his attention at once to reform and succeeded in carrying through several minor measures which improved the conditions of the country. He was made Premier in 1827, but died soon afterward and was succeeded by

GREAT BRITAIN SINCE 1837



IMPERIAL
STATE CROWN



VICTORIA
CROSS



QUEEN VICTORIA



PRINCE ALBERT



KING GEORGE VI



KING GEORGE VI



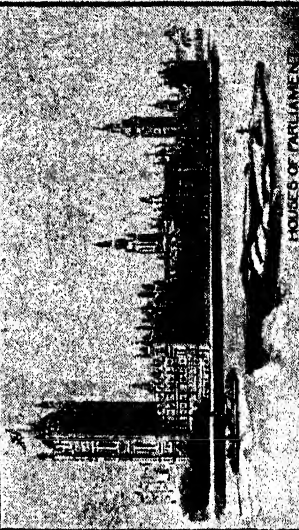
RHODESIA
BECHUANALAND
CAPE COLONY
NATAL
SOUTH AFRICA
AND THE BOER WAR



WORLD WAR 1914-1919



PRINCIPAL POSSESSIONS
OF GREAT BRITAIN



HOUSES OF PARLIAMENT

Wellington. Wellington, although a Tory, carried on the reform movement, and in 1828 the Test Act was repealed. As a result of the Irish agitation under O'Connell in the following year, the Ministry was also forced to agree to Catholic emancipation. William IV, when he came to the throne in 1830, found himself confronted with the necessity for further reforms, and two years later he was compelled by Grey to agree to the creation of a number of peers, to make possible the passage of the Great Reform Bill of 1832. The next noteworthy measure was the abolition of slavery in the colonies in 1833.

In 1837, Queen Victoria came to the throne. Her long reign of sixty-four years was a period of wonderful development and expansion, and Great Britain through it all marched steadily forward to a greater democracy. The queen wisely left political matters to the judgment of such notable Ministers as Peel, Palmerston, Disraeli, Gladstone and Salisbury, but her moral influence was at all times in evidence. During her reign the Sepoy Mutiny in India was checked (1857), and the rule of India was transferred from the East India Company to the Crown. In 1876 Queen Victoria assumed the title Empress of India. Other notable events were the repeal of the Corn Laws (1846), making Great Britain a free-trade nation; the Crimean War (1854-1856); the Reform Act of 1867, extending the franchise; the disestablishment of the Irish Church (1869); the development of British control in Egypt; and the South African War (1899-1902). In this reign, too, came those productions in fiction, poetry and the essay which made the name Victorian Age glorious in English literature.

The reign of Edward VII (1901-1910) was marked by the king's activity in political affairs, both at home and abroad, by the federation of the Australian colonies, by the close of the war in South Africa and by the growth of a strong feeling of loyalty throughout the British Empire. The political situation in England was complicated by the refusal of the House of Lords to pass the Lloyd George budget of 1909, providing for a greatly increased tax on land. The unexpected death of King Edward on May 6, 1910, caused a truce, which was brought to a close by the final passing of the bill. This important measure was signed by the new king, George V.

One result of the struggle over the budget bill was the passage, in 1911, of an act depriving the House of Lords of final veto power over any bill passed by the House of Commons. The Liberal government of Herbert Asquith, in which Lloyd George was Chancellor of the Exchequer, sponsored many social reforms, but these problems, the troublesome Irish Question and the militant campaign of the woman suffragists were all overshadowed in 1914 by the World War crisis. Social reforms were continued after the war, full woman suffrage was granted in 1918, and the Irish Free State was established in 1921, solving the problem of Home Rule.

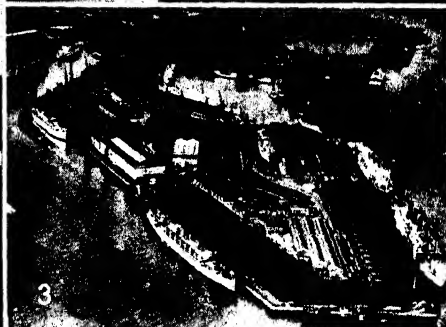
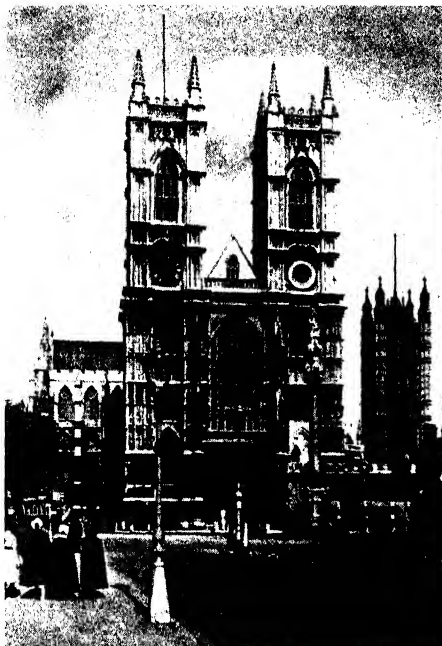
Lloyd George had succeeded Asquith as Premier in 1916. His Ministry was defeated in 1922, and thereafter the Liberal party dwindled into obscurity. Conservatives and Labor became the dominant political parties, and after the Conservative governments of A. Bonar Law and Stanley Baldwin ran their course, Labor won its first Parliamentary victory in 1924. J. Ramsay MacDonald was Premier during the few months of the Labor Ministry, and was returned to power in 1929, when Stanley Baldwin's second Ministry was defeated. In 1931 the British went off the gold standard in order to avert financial disaster. MacDonald resigned because of ill health in 1935, and a reorganized National government was continued under Prime Minister Baldwin.

In 1926 Canada, Australia, New Zealand, Newfoundland, South Africa and the Irish Free State were recognized as self-governing Dominions in the British Commonwealth of Nations. In 1935 a new India Act authorized the creation of an Indian federation with near-Dominion status, and an Anglo-Egyptian treaty of 1936 made Egypt virtually independent, Britain reserving the right to retain garrisons in the Suez Canal zone. George V was succeeded in January, 1936, by his eldest son, who ruled as Edward VIII. On December 10, 1936, Edward abdicated because of a Constitutional crisis arising from his determination to marry an American-born woman. Edward's brother, the Duke of York, succeeded as George VI.

Related Topics. The reader will find additional information in the titles that follow:

GEOGRAPHY

See lists under England, Ireland, Scotland and Wales.



- 1—Westminster Abbey, where English Monarchs have been crowned since William the Conqueror in 1066.
- 2—Famous Chalk Cliffs near Dover, pierced by Railway Tunnel.
- 3—A busy seaport: the Great Docks at Southampton.
- 4—London and Thames River from the air; the heart of England's commercial activities.

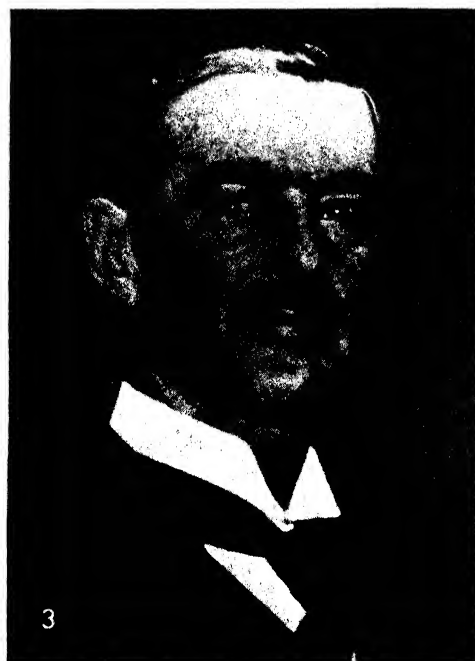
1, 2 and 4 from Ewing Galloway; 3 from Underwood & Underwood



J. RAMSAY MAC DONALD



STANLEY BALDWIN



NEVILLE CHAMBERLAIN



SIR JOHN SIMON

BRITISH STATESMEN

COLONIES

See British Empire.

GOVERNMENT

Cabinet Premier Privy Seal
Magna Charta Privy Council Supremacy

HISTORY

Black Hole of Calcutta	Paris, Treaties of
Chartism	Qubec, Battle of
Clayton-Bulwer Treaty	Quebec Act
Continental System	Test Acts
Corn Laws	Trafalgar
Crimean War	Transvaal, The
East India Company	Trent Affair, The
Fifteen Decisive	Seven Years' War
Battles	South African War
French and Indian	South Sea Company
Wars	Revolutionary War
Hay-Pauncefote Treaty	Stamp Act
Home Rule	War of 1812
Jay Treaty	Waterloo
Liberal	Webster-Ashburton
London Company	Treaty
Navigation Acts	

LITERATURE

See Literature, subhead English Literature.

BIOGRAPHY

For rulers, see England, subhead History

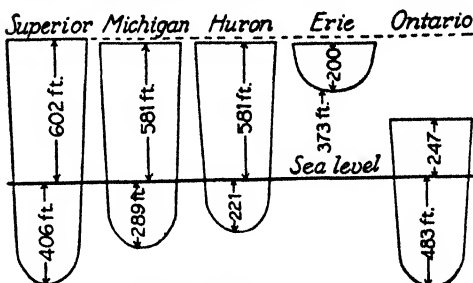
Asquith, Herbert	Grey, Edward, Viscount
Henry	Haig, Sir Douglas
Baden-Powell, Robert	Hastings, Warren
Balfour, Arthur James	Howe, Sir William
Beatty, Sir David	Jamson, Leander Starr
Braddock, Edward	Jellicoe, Sir John
Bright, John	Kitchener, Earl
Bryce, James	Lansdowne, Lord
Burgoyne, John	Law, Andrew Bonar
Burke, Edmund	Lytton, Edward Rob-
Burns, John	ert Bulwer
Carson, Sir Edward	Macaulay, Thomas B.
Chamberlain, Joseph	Marlborough, Duke of
Chesterfield, Earl of	Milner, Alfred
Churchill, Winston L.	North, Lord
Clive, Robert	Northcliffe, Lord
Cobden, Richard	Pauncefote, Julian
Cornwallis, Charles	Peel, Sir Robert
Curzon, Lord	Pitt, William
Dufferin and Ava,	Reading, Lord
Marquits of	Redmond, John E.
French, Sir John	Rhodes, Cecil John
Gage, Thomas	Roberts, Earl
George, David Lloyd	Shackleton, Sir Ernest
Gladstone, William E.	Walpole, Horace
Gordon, Charles G.	Wellington, Duke of
Grey, Earl	Wolfe, James

GREAT DANE, a breed of unusually large dogs, originating in Denmark, from which fact the name is derived. These dogs are famed for their muscular build, good appearance and agility. They weigh about 100 pounds, are of various colors, and are sometimes spotted.

GREAT FALLS, MONT., founded in 1883, is the county seat of Cascade County, nearly 100 miles northeast of Helena, on the Missouri River and on the Great Northern and the Chicago, Milwaukee, Saint Paul & Pacific railroads. The city has large copper and zinc smelters that are among the world's largest. Here also is a division headquarters of the Great Northern Railroad. The city has Ursuline Academy, a Carnegie Library, a normal college, Intermountain Union College, and the state school for deaf and dumb, and two hospitals. There are seventeen public parks. The elevation at this point is 3,350 feet above

the sea. Population, 1920, 24,121; in 1930, 28,822.

GREAT LAKES, THE, several notable and very important inland bodies of water, all except one lying between the United States and Canada, comprising lakes Superior, Michigan, Huron, Erie and Ontario. Lake Michigan is entirely within the United States, for nearly its whole length forming the boundary between Michigan and Wisconsin. Lake Superior has an elevation of 600 feet above sea level, while the elevation of Lake Ontario is only 247 feet. The fall of



THE GREAT LAKES

Lake Superior to Lake Huron is about 21 feet; of Lake Huron to Lake Erie, about 19 feet, and of Lake Erie to Lake Ontario, 326 feet. The accompanying diagram shows their relative position and altitude, their total depth and the parts which are above and below sea level. The level of Lake Michigan is that of Lake Huron.

No large river flows into the Great Lakes. The Saint Lawrence River is the outlet. These inland seas constitute the largest body of fresh water in the world, covering an area of over 94,500 square miles, exceeding the combined area of Illinois and Indiana, and almost equalling that of Oregon.

The Great Lakes are the key to the modern industrial and commercial progress of the United States. More than half of the vessels registered in the United States in 1917 were on the Great Lakes. On their shores are rich farms and in the southern and western region of Lake Superior there are some of the world's most valuable mines of iron ore. There are numerous ports on the Great Lakes, the most important of which are Duluth, Milwaukee, Chicago, Detroit, Toledo, Cleveland and Buffalo.

The lake and river routes are extended greatly by means of canals, first of which is the Erie Canal, from Buffalo to Albany in

New York. The Sault Sainte Marie is another canal of importance. This canal allows boats to pass from Lake Superior into Saint Mary's River and thus connects with the lower lakes (see SAULT SAINTE MARIE CANAL). Other canals are the Welland, which connects Lake Erie with Lake Ontario and passes around the falls in the Niagara River (see WELLAND CANAL), and the system of canals around the rapids in the Saint Lawrence. Canals have also been constructed connecting Lake Erie with the Wabash and Ohio rivers, passing through the State of Ohio by way of Columbus and Cincinnati.

The Great Lakes are valuable for their fisheries, which amount to about \$5,000,000 every year, herring, white fish and trout being the leading species taken.

Related Articles. Consult the following titles for additional information:

Erie, Lake	New York State Barge
Erie Canal	Canal
Huron, Lake	Ontario, Lake
Michigan, Lake	Superior, Lake
	Welland Canal

GREAT LAKES NAVAL TRAINING STATION. See NAVAL TRAINING STATION, GREAT LAKES.

GREAT PEDEE' RIVER, a name formerly applied to the Yadkin River after it enters South Carolina. It is now called simply the Pedee. The river rises in North Carolina in the Blue Ridge and flows in a southeasterly direction. Its affluents are the Little Pedee and Waccamaw, and it flows into the Winyaw Bay at Georgetown. It is navigable for 150 miles.

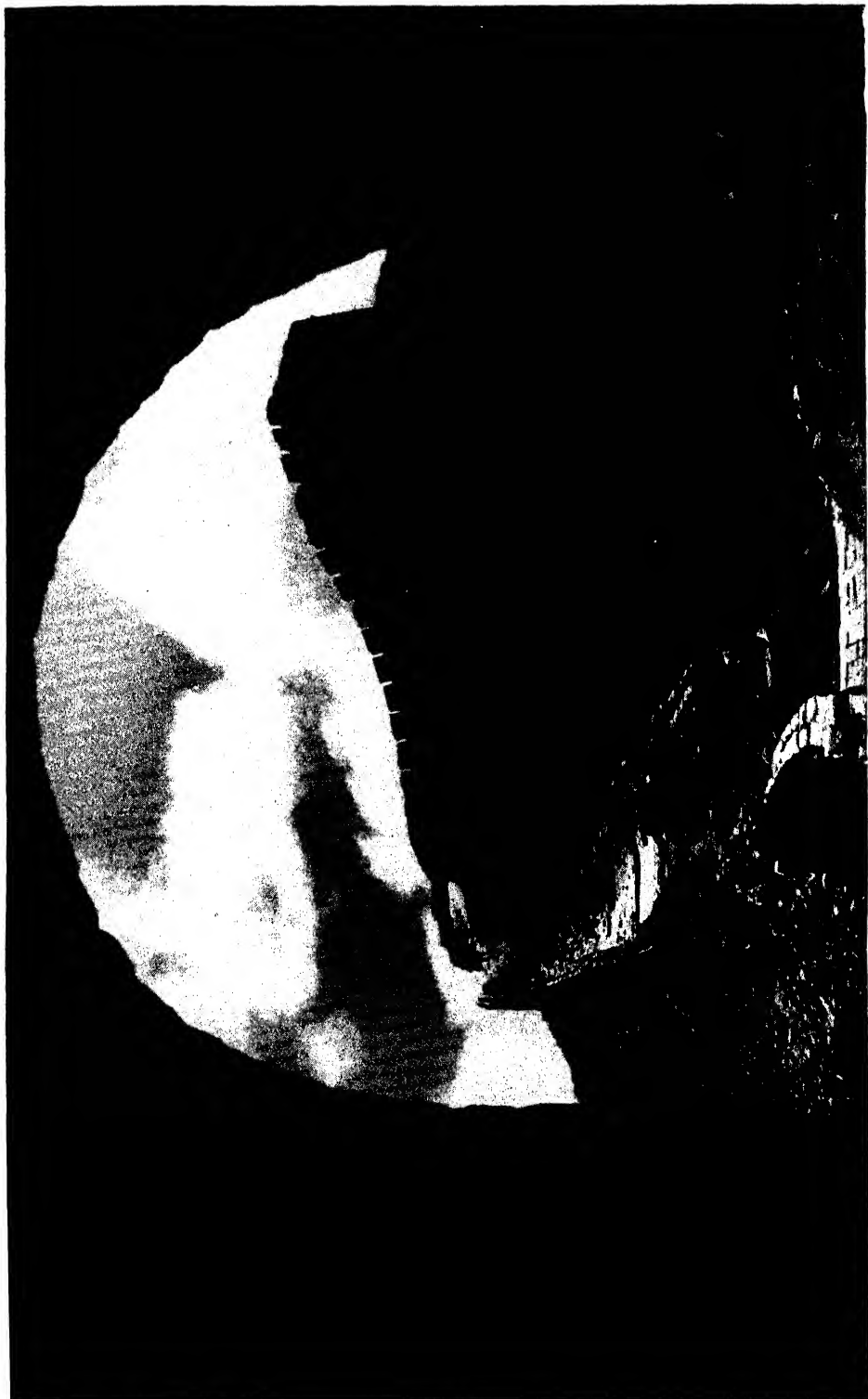
GREAT SALT LAKE, one of the natural wonders of the world, situated in a beautiful region in the northwestern part of the state of Utah. It is seventy miles long and thirty-five miles wide. The surface is 4,000 feet above sea level. There are several islands in the lake, and these, and also the shores, are whitened by salt deposits. About 40,000 tons of salt are taken from the lake each year, and this is separated by drawing off the water into shallow lakes and allowing it to evaporate. Ages ago the lake covered an area of about 50,000 square miles, and then its elevation was nearly a mile higher than it is today; this is evident from numerous old shore lines that remain apparent. Many years ago this body of water was called Lake Bonneville, in honor of one of the first white men who explored hereabouts. The lake contains no fish, but a brine

shrimp is found in it, and it is frequented by large flocks of gulls, ducks, geese and swans. The water is so dense with mineral matter that bathers never sink in it. Three rivers, the Bear, Jordan and Weber, flow into it, but there is no outlet. A railway called the Lucin Cutoff crosses the lake near its middle; it is built upon a trestle and on solid salt beds.

GREAT SLAVE LAKE, the second largest inland lake in Canada, situated in the North West Territories. It is about 300 miles long and fifty miles wide, and has an area of 10,719 square miles. Among Canada's lakes only Great Bear Lake is larger. On the north are rugged and steep shores, and in the lake are many islands. It receives the surplus waters of lakes Aylmer and Artillery, on the north, and those of Lake Athabasca, by way of the Great Slave River, on the south.

GREAT WALL OF CHINA, the most colossal fortification in the world. It forms the boundary between Mongolia and China proper, and extends beyond to the Sungari River. It is about twenty-two feet high and twenty feet broad, and has towers at intervals of a few hundred yards. It is built of brick or dressed granite shell, filled with earth. In the third century B. C. a crude earthwork was erected as a defense against the Tartar tribes. This was replaced at a much later date by the present wall, which dates from the fourteenth century. The entire length of the wall is more than 1,500 miles, the distance from New York to Omaha. It follows a winding course, over hills and through valleys, and is in a fair state of preservation for hundreds of miles.

GREBE, greb, a water bird whose feet are not webbed, but whose toes are bordered with a wide membrane. The legs are thin, flat and bladelike. When the birds are on land, they sit erect and are exceedingly awkward and unwieldy in their movements, but in the water they are excellent swimmers and divers and are very graceful. There are nine species known in North America, of which the common grebe, or, as it is sometimes called, the *hell diver*, is the most common. The *crested grebe* is a larger bird, having beautiful silvery breast plumage. Unfortunately, this fine, close, silky plumage has become fashionable for muffs and trimmings; so many of the birds are killed each year to satisfy the demands of fashion that there is danger the species may become extinct.



Ewing Galloway

CRUMBLING RUINS OF THE WORLD'S GREATEST ENGINEERING FEAT

An impressive setting for a view of the Great Wall of China. It was built in the fourteenth century to protect China from invaders from the north. The wall is long enough to reach from New York City to Omaha, is twenty-five feet high and twenty feet wide.



Ewing Galloway

GREECE IN MODERN SETTING

Shepherds in a rural community and the rude huts in which they live. A guard at the palace gates, in the uniform of an older day, preserved for this formal office. A monastery on Mount Athos.



A Greek
in holiday dress

GREECE, a kingdom which occupies the southern part of the most eastern peninsula of Europe. This country was in ancient times the home of the most advanced people of the world. Edgar Allan Poe's famous line, "To the glory that was Greece," suggests something besides a poet's eloquence, for the Greece of antiquity was the cradle of the very highest achievements in architecture, in sculpture and in literature. Modern civilization has never produced a building so perfectly proportioned as the Parthenon, nor sculpture more exquisite than the frieze that adorned its walls. The ancient Greeks, too, set the pace for the rest of the world in poetry, history, oratory and philosophy, and in one section of the country, Attica, was reared a state based on complete democracy. With all this background of a glorious past, the Greece of to-day is a second-class power, and is struggling with many economic and political problems. Indeed, its modern history as an independent power dates only from 1827, and it has had to fight more than one exhausting war since then.

Size and Population. Previous to the Balkan Wars of 1912 and 1913 Greece had an area of about 25,000 square miles. As a result of the war with Turkey in 1912 and with Bulgaria in 1913, there were annexed to Greece a number of the Aegean islands, including Crete and Samos, and a large portion of Macedonia, so that the total area in 1914 was 46,345 square miles; since 1933, 48,268 square miles. The population by 1928 census was 6,204,684.

Physical Features. Even a casual glance at a map of peninsular Greece would impress one with the remarkable irregularity of its coast line. The shore is everywhere deeply indented by bays and gulfs, and the southern part of the peninsula, the Peloponnesus, is almost an island, so far inland do the gulfs of Aegina and Corinth penetrate. There are about 2,500 miles of coast line bordering the old territory of 25,000 square miles, giving that section of the

country one mile of coast for every ten square miles of area. In ancient times the fact that no one lived very far from the water created in the Greeks a love for the sea, and made them a nation of sailors and colonizers.

With its rugged mountains and turbulent rivers, Greece is a land of beautiful scenery. The peninsula is divided from northwest to southeast by the Pindus range, which forms the principal water divide. In the north are the Cambunian Mountains, a range running from east to west. The eastern extremity of this range is Mount Olympus, whose summit the ancients believed was the abode of the gods.

Thessaly, in the northeast, is separated from the rest of Greece by Mount Oeta, which protected Middle Greece from invasion as long as the few mountain passes were well guarded. The mountains of Greece which have special historical associations are Olympus, which has already been mentioned; Parnassus, which is sixteen miles north of Corinth and was the fabled home of the Muses; Ossa, and Pelion, south of Olympus near the coast, and Hymettus and Pentelicus, near Athens, the former noted for its honey, the latter for its marble quarries. The Peloponnesus is broken up by chains of mountains which spread out in all directions from the central state of Arcadia. The mountainous character of the country had a strong influence on its ancient history, as it tended to keep the states separate and prevented the formation of a central government (see *History*, below).

The rivers of Greece, on account of the peculiar formation of the surface of the country, are of little importance. Most of them have short courses and rapid falls and are therefore not navigable. Many of them dry up in the summer and form rushing brooks in the winter. The most important of the rivers are the Achelous and, in the Peloponnesus, the Alpheus and the Iri (Eurotas). Lakes are numerous in the mountain regions. The numerous islands by which Greece is surrounded belong to it by virtue of their physical and geographical structure. They are all mountainous and were probably at one time part of the mainland, Euboea appearing to be but a prolongation of the mountainous coast of Thessaly.

Climate. The climate of Greece is in the main, temperate and healthful, although it

varies so greatly in different parts of the country that it is almost impossible to make any general statement regarding it. For example, at the same season of the year, at points not widely separated, may be found the heat of summer, the warmth of spring and the severity of winter. As in many other Mediterranean countries, the sirocco has a most unfortunate effect on the climate at certain seasons of the year (see SIROCCO).

Mineral Resources. Greece has a great variety of minerals, but the absence of coal has put many difficulties in the way of mining them. There are in force, however, about thirty-five mining concessions, embracing a total area of nearly 20,000 acres. Thessaly, Euboea, the Aegean islands and other districts yield a large output of earths, such as lignite-sulphur ocher, and there are worked a number of ores and minerals, including iron, lead, magnesite, zinc, salt and nickel. Pentelicus, a mountain range in Attica, possesses quarries of the white marble which sculptors used in ancient times for their wonderful statues.

Agriculture. Though chiefly an agricultural country, Greece is not so well favored for farming as many other countries. The soil is thin, and the rainfall is light, while the scarcity of rivers is an obstacle to extensive irrigation. To a considerable extent, the land is in the hands of peasant farmers, large proprietors being the exception. The currant, a seedless grape made into wine or eaten dried, is the chief product, with a yield of about 140,000 tons a year. The cereals grown are wheat, barley, rye and maize, and other products are tobacco, citrus fruits, grapes, olives and figs. Olive oil, which is used by the people in place of butter, is one of the chief articles of export. Vegetable gardens are numerous, and cheese is made in large quantities from the milk of sheep and goats.

Manufactures. Lack of coal and water power prevent any great development of manufacturing. Carpets and cloth are made in the homes of the peasants, and there are a few factories which produce articles for domestic use, such as soaps, chemicals, textiles, flour and leather goods. Shipbuilding, however, is a thriving industry in every seaport town.

Transportation and Commerce. At the outbreak of the World War there were about 1,365 miles of railroad open to traffic, but the

country had no rail connection with the rest of Europe. Since 1920 the railroad mileage has increased to 1,670, and there is connection with countries to the north. Of the total mileage, 825 miles are state-owned and operated. An air service connects the larger Greek cities, and foreign air service reaches to European capitals. The only canal in Greece, across the historic Isthmus of Corinth, is navigated by about 4,000 vessels a year in normal times. The commerce of Greece is not large, averaging between \$45,000,000 and \$60,000,000 a year. Trade is chiefly with Great Britain. Currants are the largest item of export, and wheat predominates among the imports.

Education and Religion. There is a compulsory-education law, ordering school attendance of children between the ages of six and twelve, but it is not well enforced in rural districts. Of the army recruits thirty per cent can neither read nor write, and fifteen per cent can read only. The educational system includes elementary schools, high schools, middle and commercial schools, two agricultural schools, a trade and industrial academy, and two universities, both at Athens.

The predominant religion is the Orthodox Greek faith, and nine-tenths of the people are of this religion. The king is required, unless a special exception is made, to be a member of this Church, and he is recognized as its temporal head. The affairs of the Church are managed by a permanent synod, which meets at Athens. Religious freedom prevails everywhere.

Literature. See LITERATURE, subhead *Greek Literature*.

Art and Architecture. See PAINTING, subhead *Ancient Period*; SCULPTURE, subhead *Greece*; ARCHITECTURE, subhead *Greek Architecture*.

Inhabitants and Language. Of the population of Greece, about nine-tenths are Greeks, the remainder being largely Albanians. Only about one-third of the Greek people live in Greece itself, and Turkey has almost as many Greek inhabitants as has the Greek kingdom. The language spoken is largely the modern Greek, which bears a very close resemblance to classical Greek, differing in fact from the Attic little more than the classical Attic and Doric dialects differed from each other. See GREEK LANGUAGE.

Government. The government of Greece



THE DEPARTURE OF ACHILLES
(FROM AN ANCIENT VASE)



ACHILLES



THE WOODEN HORSE
AN INCIDENT OF THE TROJAN WAR

GREECE

THE HEROIC PERIOD

1400-1100 B. C.



FORTY-EIGHT-OARED GREEK BOAT
(FROM AN ANCIENT VASE)



ANCIENT GREECE
SCALE OF MILES



HOMER



THE WORLD ACCORDING TO HOMER

Chronological Summary

	B. C.
Conquest of the Peloponnese by the Achaeans	1370
Southern Greece by the Achaeans	1370
The Trojan War	1194-1184
The Dorian Migration	1100

is an hereditary constitutional monarchy. Originally there were two houses in the Greek legislature, a Senate and a House of Representatives, but on the accession of George I, in 1864, the Senate was abolished, and the sole legislative power rested with the House of Representatives, known as the *Boule*. Male suffrage is universal, and elections are by ballot. A Ministry consisting of the heads of the departments of state, exercised under the king the executive functions. In December, 1923, the forces of republicanism brought about a general election for a National Assembly to consider the establishment of a republican form of government. King George II left the country while this matter was being discussed. Former Premier Venizelos was elected President of the Assembly. By a decisive popular vote, Greece adopted the republican form of government. Recognition of the new government was quickly extended by several great powers. For later details, see the end of this article.

History. Early Period. In earliest Greek history, both coasts of the Aegean were occupied by Indo-Germanic peoples. The Greeks themselves did not know much about the relations of their ancestors with the original inhabitants of Greece. The people who were thought by the Greeks to have been the original inhabitants were called Pelasgians. They had lived originally in Thessaly, where they were in constant warfare with their neighbors, the Hellenes, and when the latter came into Greece, they called all tribes who could not account for their ancestors Pelasgians. So far as we know, the Greeks were the first inhabitants of the land of Greece. Much light has been thrown, of late, on the so-called Heroic Age, by excavations, chiefly at Mycenae, Troy and cities on the island of Crete. These cities seem to have been the centers of an advanced civilization, and as Mycenae was the chief center the period has been given the name of the Mycenaean Age.

Greek Middle Age. The period from about 1200 to 700 B. C. corresponds in the history of Greece to the Middle Ages in later European history, in that it lay between two periods of culture and prosperity. Events of this period are best explained on the basis of the so-called Dorian migration, although some historians treat the history of Greece without reference to any such migration. The Dorians themselves were conscious

of being conquerors in the land in which they dwelt, and the fact that the great epic poems did not mention the Dorians shows that the authors of such poems must have known that the Dorians were newcomers. Legends represent the Dorians as coming from Epirus. They were, on entering the Peloponnesus, ruder and more warlike than the earlier inhabitants of the Peloponnesus, and their settlements in the most civilized parts of the ancient Mycenaean kingdom completely overthrew the earlier civilization. The Dorian dialect supplanted the native language, but the newcomers accepted largely the gods and the sanctuaries of their predecessors. This migration cannot have been later than 1000 B. C.

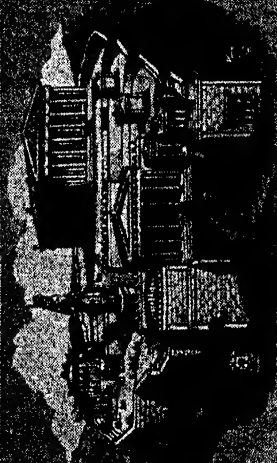
During the Mycenaean Age Greece had been largely affected by Oriental influences; during the Greek middle age, on the other hand, the land was left largely to itself. When the Dorians first settled down in the Peloponnesus, the largest and most important political division of the people was the tribe—the assembly of freemen for war. At the head was the tribal king, with elders. The state was not conceived of as existing for the protection of the individual, who was considered a nobody, except when he interfered with the tribe. Custom was the binding power, and there was no such thing as law. Gradually, after the settlements, the notion of private property appeared, and from this grew the beginnings of differences in rank. The men who had gained the largest tracts of land became more powerful and at length took titles. In Sparta, however, old conditions survived longer than in any other place, and there was no aristocracy there. The development of the city-state was another important effect of the settlement. This organization spread over all Greece and came to be the determining factor in Greek history. In some cases the old tribal king became a local king, but his power was lessened as different officials were elected to assist him and as the council gradually assumed more of his functions.

During the Greek middle age the most important states were those on the coasts of Greece and Asia Minor and those on the islands between. In Asia Minor the leading city was Miletus, while in Greece proper the foremost cities were Euboea, Chalcis and Eretria. A distinct colonizing impulse appeared in Greece from the eighth to the sixth

GREECE

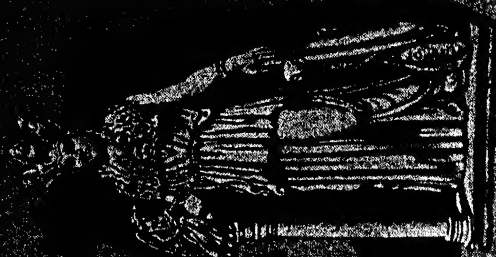
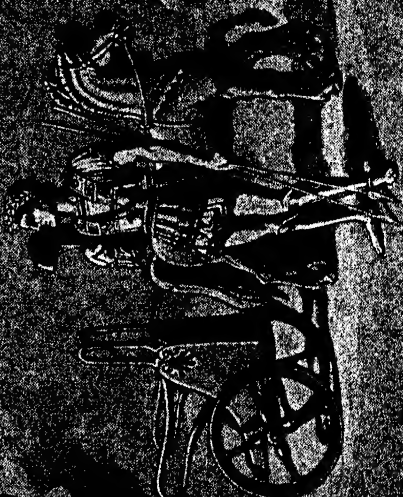
THE PERIOD OF GLORY

500-431 B.C.



Chronological Summary

The Ionic Revolt	500-494
Battle of Marathon	490
Thermopylae and Salamis	480
Plataea and Mycale	479
Conquering of Delos	478
Pericles in Exile	467-457
The Long Walls built at Athens	462
The Thirty Years' Truce	449
The Parthenon Completed	438



THE PERIOD OF GLORY

THE PERIOD OF GLORY

centuries B. C., and numerous trading stations were established, chief among which were Syracuse in Sicily, Tarentum in Italy, Corcyra in the Adriatic, Massilia (Marseilles) in Gaul, Cyrene in Africa and Byzantium on the Bosphorus.

Although during this period, as well as during later periods, the Greek communities were practically independent, there were unifying influences which the people were prompt to recognize as soon as any danger from without threatened them. Sparta, in the Peloponnesus, was developing unity by its conquests, and the epic poetry which dealt with the former glory of Greece was a strong unifying force.

Growth of Popular Rights. The third period of Greek history, from 700 to 500 B. C., may be known as the age of class struggles and adjustments. In the seventh and eighth centuries the Ionian cities took the lead in Greek civilization. They were the first to be strongly affected by commercial and colonizing activities, and they brought the Greeks of the mainland into closer relations with the Orient. During this period the chief bond of union between the Greek states was commerce, and not the idea of blood relationship, which had been strongest in the earlier period. Leagues based upon commercial interests were formed between states, and commercial quarrels were pursued regardless of blood ties.

Meanwhile, the middle class came forward and demanded many privileges which had before belonged exclusively to the aristocracy. The individual, too, began to demand rights, and general dissatisfaction arose with the old laws. To satisfy new conditions in each district, lawgivers were appointed, who possessed the powers of dictators and were empowered to draw up a code of laws. Among these lawgivers the most famous were Lycurgus of Sparta and Solon of Athens. The most important result of this new system of laws was that the people now knew what the laws were and could fix the responsibility for crime and injustice. Thus successful in their first opposition to the aristocracy, the people put forth a strenuous effort to overthrow completely the aristocratic government. Here and there men of genius or ability put themselves at the head of the revolutionary movements and gained unlimited power. These men were called tyrants, and they were practically

kings, although in most cases they enjoyed larger power than the earlier kings had done.

Persian Wars. In the fourth century B. C. a common danger drew the Greek states closer together than they had ever been before. The Ionian cities had been conquered in the sixth century by the king of Persia, and when in 500 B. C. some of the cities revolted against the Persians, the Athenians sent ships to assist them. The Athenians met with some successes, but were finally completely defeated by the Persians in a battle near Ephesus. Darius, the Persian king, was enraged by the share which the Athenians had taken in this revolt, and in 492 B. C. he dispatched Mardonius, his son-in-law, into Greece to punish the Athenians. A storm off Mount Athos destroyed a large part of the Persian fleet, and the army of Mardonius suffered so severely from the attacks of the Thracians in his march through the country that he retreated to Asia. Darius, however, was still unappeased, and two years later he sent another force into Greece, which was completely defeated by a band of Athenians and Plataeans on the Plain of Marathon. This defeat of the Persians had great moral significance. The expedition had been small because the Persians believed that Greece could be conquered without much difficulty, but the defeat of this small force by a small force of Greeks greatly lessened the fear which was felt of the Persians.

By its part in the defeat of Persia, Athens had risen to the acknowledged headship of Greece. Themistocles, foreseeing that the struggle was not over, persuaded the Athenians to enlarge their naval force, upon which he felt sure the chief dependence of the Greeks would of necessity be in a further struggle. In 480 B. C. Xerxes, the son of Darius, undertook to carry out the project in which his father had twice signally failed. With an army which is said to have numbered over 2,000,000, he crossed the Hellespont and marched along the coast through Thrace and Macedonia toward Attica. Sparta and Athens summoned a congress of the Greek cities to meet at Corinth, but not all of the cities were represented, and of those which were, all did not enter into the alliance. Themistocles proposed a plan of campaign which was finally adopted. This was to avoid a battle on land, because the Persian army was so much larger than the Greek, but to attempt to force a naval battle as soon as possible,



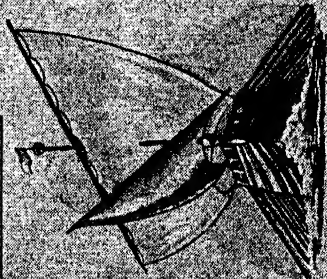
GREECE

THE PERIOD OF DECLINE

431-146 B. C.

Chronological Summary

Peloponnesian War	B.C.
Death of Pericles	429-404
Supremacy of Sparta	404-371
Battle of Leuctra	371
Alexander's Empire	323-322
Wars of the Succession	322-296
The Gallic Invasion	279
Battle of Cynossema	216
Capture of Syracuse	212
Destruction of Corinth	146



Men of the Period

- Socrates
- Plato
- Aeschylus
- Lycurgus
- Xenophon
- Demetrius
- Demosthenes



Battles

- Marathon
- Agincourt
- Siege of Athens
- Leuctra
- Chalcedon
- Graecus
- Arabe

because it was felt that on the sea Greece was more nearly the equal of Persia.

A small force was sent to block the enemy's advance at the narrow pass of Thermopylae, which formed the only entrance into Greece. On the third day of the struggle at Thermopylae the Persians were led around over a pass to the rear of the small Spartan army, and the defenders of the pass were all put to death. The great naval battle at Salamis and the battle at Plataea, in both of which the Greeks were victorious, drove the Persians from Greek territory, and they never again attempted to enter it. The victory for the Greeks had been the result of the united action of the different states, the superiority of the Greek infantry, the inability of the Persians to use their cavalry in the mountainous country and the superior seamanship of the Greeks. These wars in their happy issue gave the Greeks half a century of peace and gave Athens and Sparta, the two great powers, leisure to develop their civilization practically unhindered. It was during this period that Athens became the center of Grecian art and literature.

Rivalry between Sparta and Athens. The first serious break in the peaceful and prosperous condition of Greece came with the Peloponnesian War, which began in 431 B. C. The rivalry between Athens and Sparta was not such as to render war inevitable, as Athens was the chief power on the sea and Sparta on the land. There was constant jealousy between the two, however, and an occasion for war was found in the relation of Athens to its allied states. Sparta's plan at the beginning of the hostilities was to ravage Attica and stir up the colonies of Athens to revolt, while that of Pericles was to occupy as far as possible the coast towns and the islands, to destroy the commerce of the Peloponnesus and to risk no land battles. This plan worked well for Athens until a plague broke out in the city and carried off more than one-fourth of the population. Pericles was among the victims, and there was no one who could take his place. The disastrous expedition to Sicily in 415 B. C. turned the tide against Athens, and although the city held out for ten years longer it was compelled by the destruction of its fleet at Aegospotamos, in 405, to surrender in the next year to Sparta and to accept humiliating conditions of peace.

Sparta and Thebes. The Athenian leader-

ship was thus brought to an end, and for thirty-five years following the Peloponnesian War Sparta was supreme in Greece. The smaller Greek states, which had hoped for independence as the outcome of the war, were disappointed in their expectations, as the Spartan period of rule was marked by the restoration of oppressive and tyrannical oligarchies upon the ruins of the democracy for which Athens had been fighting. At length, so unendurable did this tyranny of Sparta become, the other states rose in revolt under the leadership of Thebes. With Pelopidas and Epaminondas to guide the movement, the revolt was speedily successful, and at the great Battle of Leuctra, in 371, the hitherto undefeated Spartan army was utterly overthrown. The Theban supremacy, which lasted for less than ten years, again made democracy the dominant form of government in Greece. In 361 B. C. Athens and Sparta, the old-time rivals, combined against Thebes. At the Battle of Mantinea Epaminondas was killed, and with his death the Theban power ended.

Rise of Macedonia. The death of Epaminondas threw Greece into confusion. The entire history of the Greek states had consisted in a series of struggles against the idea of unity under one imperial power, and these very struggles for independence had so weakened the states that they fell an easy prey to the strong power which was rising in the north. This was the kingdom of Macedonia, under Philip. By means of skilful intrigue and almost unopposed conquest, Philip gained control of Olynthus, Thrace and Phocis. At Athens Demosthenes saw the peril, and in his famous *Philippics* he urged his countrymen to meet it. Thebes and Athens combined against Philip and met him at Chaeronea in Boeotia (338 B. C.), but were utterly defeated. A congress of the Greek states, held at Corinth, recognized Philip as their leader and declared him commander-in-chief of the Greek forces. This conquest by Philip did not mean the complete subjugation of the Greeks; the Macedonians were a Hellenic people, and Philip himself recognized the superiority of Greek life and culture over Macedonia. Philip was succeeded by his son Alexander, under whom Grecian influence was extended over a great part of Asia.

The Roman Conquest. The history of Greece and Macedonia for nearly two cen-

GREEK CIVILIZATION



Civilization
 Art
 Architecture
 Sculpture
 Painting
 Music
 LITERATURE
 Philosophy
 Oratory
 Poetry
 Drama
 RELIGION
 Myths
 Oracles
 INSTITUTIONS
 Social Customs
 Festivals
 Slavery

STYLES OF HAIRDRESSING

turies after Alexander is marked by continued internal dissension, by the invasion of the Gauls (279 B. C.), and by the increasing danger from the rising power of the West. Most of the states were grouped under two confederacies, the Achaean and the Aetolian leagues. A united Greece might have remained independent, but under the prevailing conditions resistance to Rome was but feeble and ended with the capture and burning of Corinth in 146 B. C., after which Greece was made a province of Rome, named Achaia.

For over half a century the country prospered, but a revolt during the Mithridatic War brought down upon Greece the vengeance of Rome. Athens was sacked by Sulla in 86 B. C. and Thebes was destroyed in the following year. During the period following the establishment of the Empire, Greece prospered under Roman rule, its condition being most favorable during the reign of Augustus and later under Trajan and Hadrian. Athens retained preëminence in art and letters, and many of the young men of Rome were sent to Athenian schools. Christianity made wonderful progress during this period and finally triumphed over the ancient paganism. In 330 Constantine moved the seat of the Roman Empire to Byzantium, afterward called Constantinople. After the division of the Roman Empire into the Eastern and Western empires, in 395, Greece was a part of the Byzantine Empire until the capture of Constantinople by the Turks in 1453.

Under Turkish Rule. After the fall of Constantinople, Greece was speedily subdued and was incorporated in the Turkish Empire. Under their barbarous conquerors, the Greeks sank into a pitiable condition, but their devotion to their Church and the fact that the system of local self-government had been allowed to exist helped in preserving their nationality, in spite of the persecutions of the Turks.

The War for Liberation. In 1821 the war for independence broke out under Alexander Ypsilanti. The Turks by wholesale massacres and executions tried to check the revolt, but the Greeks were determined, and in January, 1822, the national assembly convened at Epidaurus, adopted a provisional constitution and proclaimed Greece independent.

The cruelty with which the Turks treated the Greek Christians and also those in Con-

stantinople aroused the sympathies of civilized Europe. Many champions appeared, among them Lord Byron. The struggle was continued for nine years, and one of the most memorable events during that time was the exploit of Marco Bozzaris. The struggle was finally decided by the naval Battle of Navarino, October, 1827, in which the Turkish-Egyptian fleet was annihilated by the combined fleets of England, France and Russia. Capo d'Istria, a Greek statesman in the service of Russia, was chosen president in 1828. In 1830 a congress of the great powers in London declared Greece an independent kingdom and forced Turkey to agree to that declaration.

Greece an Independent Nation. Capo d'Istria became unpopular, because of his attempts to rule as dictator, and in 1831 he was assassinated. Otto II, son of the king of Bavaria, was chosen king, and he took the power in 1832. A constitution had not been formally promised, but the Greeks expected one, and, while Otto's rule was not despotic, the fact that he did not proclaim a constitution made them fear future danger. In September, 1843, the army and the people surrounded the palace and demanded a constitution. The king yielded without violence, and the constitution went into effect in the following year, but Otto's unpopularity increased, and in 1862 he was deposed and compelled to leave the country.

The national assembly elected Prince George of Denmark as king, the powers confirmed the election and King George took office in October, 1863. According to the agreement made by England, the Ionian Islands were annexed to Greece in the same year. George granted a liberal constitution, and Greece prospered under his firm rule. The Congress of Berlin in 1878 recommended the addition to Greece of southern Thessaly and Albania. Turkey refused, and war seemed imminent, but was averted by the cession to Greece of nearly all of Thessaly and part of Epirus.

In January, 1897, Greece attracted the attention of the civilized world by its championship of the cause of the Christians in Crete, who had revolted against Turkish rule and sought annexation to Greece. Greece attempted to annex the island, and the result was war between Greece and Turkey. The condition of Greece by no means warranted a war with Turkey, and from the first the

nation was unsuccessful on every side. The Turks were threatening Central Greece in May, 1897, but Russia stepped in and demanded that operations cease. In December of that year a final treaty was signed, by which Greece promised to pay to Turkey an indemnity amounting to \$18,000,000, the payment to be guaranteed by the powers. In 1912-13 Greece took part in the war of the Balkan allies against Turkey. As a result of that war Greece added considerably to its territory. An unfortunate after-effect of that war was the assassination of King George, in March, 1913. He was succeeded by his son, Constantine I.

In the World War. When the World War broke out, in 1914, Greece was placed in an embarrassing situation. Queen Sophia, wife of King Constantine, naturally favored the German cause, as the leader of that side, Emperor William II, was her brother. Greece was bound by treaty to help Serbia if it were attacked, but this agreement was not interpreted by Constantine as binding, and he refused to go to the aid of that small country when it was overrun by Bulgaria in 1916. Meanwhile, a strong pro-ally faction, led by Venizelos, revolted and set up a provisional government at Canea, later transferring it to Saloniki. Constantine's continued refusal to yield to the demands of the entente led finally to his forced abdication, in June, 1917. He was succeeded by his second son, Alexander. Venizelos was appointed Premier in the new Ministry, and Greece became an active participant in the great war. King Constantine regained the throne in 1920, but abdicated in 1922, being succeeded by his son, George II, who was forced to leave Greece in December, 1923. By vote of the people April, 1924, the Republic was established.

Again a Kingdom. Political intrigue was not stilled, and in 1935, by a large majority vote of the people, the monarchy was restored. King George II returned from London, where he had spent his years of exile, and in November resumed the throne.

Related Articles. Consult the following titles for additional information:

GEOGRAPHY

Aegean Sea	Delos	Marathon
Arcadia	Delphi	Mars Hill
Athens	Epirus	Melos
Attica	Helicon	Messenia
Boeotia	Ionian Islands	Mycenae
Corinth	Ithaca	Olympia
Crete	Laconia	Parnassus
Cyclades	Macedonia	Peloponnesus

Piraeus
Salamis
Saloniki
Sicily Islands

Sparta
Tempe, Vale of
Thebes

Thermopylae
Thessaly
Thrace

HISTORY

Achaeans	Helots
Alexander the Great	Ionia
Arbela	Leonidas
Archon	Lycurgus
Areopagus	Lysander
Aristides	Miltiades
Balkan Wars	Nicias
Bozzaria, Marco	Oracles
Byzantine Empire	Ostracism
Clisthenes	Pericles
Constantine I	Solon
Darius I	Themistocles
Dorians	Thermopylae
Demosthenes	Venizelos, Eleutherios
Epaminondas	World War
George I	

ART, LITERATURE, PHILOSOPHY

Aeschylus	Lysippus	Socrates
Aristotle	Phidias	Sophocles
Euripides	Plato	Thucydides
Herodotus	Praxiteles	Xenophon

UNCLASSIFIED

Acropolis	Mythology
Alexandrian Age	Nemean Games
Alexandrian Library	Olympian Games
Festivals	Parthenon
Isthmian Games	Pythian Games
Mysterics	Stadium

GREEK CHURCH, the dominating Church of the countries that formerly comprised the Greek Empire (also called Eastern and Byzantine), and of the countries converted to its teachings, as Russia. Its official name is "The Holy Orthodox Catholic and Apostolic Church," the word *Orthodox* being especially emphasized by its adherents. To distinguish it from the Roman Catholic, or Western, Church, it is often called the Eastern Church, or Greek Catholic Church. There are three distinct branches—the Church in Greece, in the Turkish Empire and in Russia. With the fall of the imperial Russian government in 1917, the Russian branch ceased to be a state Church, but the majority of the peasants clung to the old beliefs.

The difference between the Greek and Roman Churches consists in the rejection, by the former, of the supremacy of the Pope and the elimination of the word *filioque* from its creed. The Greek Church admits the seven rites of the Roman Church, namely, baptism, confirmation, eucharist, penance, extreme unction, holy orders and matrimony, but with considerable variation in their observance. Baptism consists of a triple immersion, and confirmation follows it immediately, even in the case of infants, and may be given by priests, as well as bishops. In the eucharist, or Lord's Supper, the Greeks admit the real presence of Christ in the elements, and the adoration of the host. They use leavened bread and give communion in both kinds to adults and children alike. They recognize

confession and priestly absolution. The same honor is paid to relics as in the Roman Church; pictures are adored, but no graven image, except the cross, is permitted. Fast periods and days are numerous. Pentecost, the day of Saint Peter and Saint Paul; six weeks before Christmas, and the usual Lenten fast are kept, also all Wednesdays and Fridays. The priests and deacons are usually required to marry before being ordained as clergymen. They are prohibited from marrying widows and may not themselves remarry. Bishops are forbidden marriage and hence are chosen from the monastic orders. The total membership of the Church is about 119,300,000.

GREEK FIRE, an inflammable and destructive compound used in medieval warfare, especially by the Byzantine Greeks. It was ladled from caldrons and thrown upon the enemy or ejected through long copper tubes or flung at them in pots, phials and barrels. Naphtha, sulphur and niter probably entered into its composition, which was a secret of the Greeks for centuries—a secret to which was largely due their superiority in warfare.

GREEK LANGUAGE. The Greek language is a member of the Aryan or Indo-European family, its various dialects constituting the Hellenic group. It was probably spoken at least 1,500 years before the Christian Era by the Greeks in Europe and Asia Minor. The fact that Greece was the seat of classical learning, the source of philosophy and letters and, later, the center of Christian teaching, made Greek in the early centuries of that era a universal language among the cultured classes, just as Latin afterward became the medium of international communication. During the Dark Ages Greek was little known to Western Europe, although it remained the language of the Byzantine Empire. The emigration of the Greeks to Italy after the fall of Constantinople and during the century preceding, gave a new impetus to the study of the Greek language, and the revival of learning gave it the place it has ever since occupied (see **RENAISSANCE**).

Of Greek in its earliest common form no literary monument remains. The three dialects in which it appears are designated Doric, Aeolic and Ionic. Aeolic was spoken chiefly in Northern Greece; Doric in the Peloponnesus, in Crete and in the various colonies; Ionic was used in Attica and Asia

Minor. Of the Doric, Pindar and Theocritus are the chief literary representatives. Ionic is commonly divided into three stages—the old Ionic, or epic, in which the poems of Homer and Hesiod were written; the new Ionic, the dialect of Herodotus, and the Attic, in which most of the masterpieces of Greek literature are written. The preëminence of Athens in the world of politics and of letters made its dialect the standard (see **ATHENS**, subhead *History*).

During the centuries following the classical period, Greek underwent changes due to the usual internal modification and corruption and to contact with other languages. Modern Greek has, however, preserved the integrity of the written language to a remarkable degree, so that the student of classical Greek can read modern Greek with little difficulty. The spoken language varies considerably, at least from the commonly accepted standard of pronunciation of the ancient tongue. As compared with Latin, the legacy of Greek to the English language has been small, less than one-ninth of the modern English vocabulary being of Greek origin, while nearly one-half may be traced back to sources originally Latin.

GREEK LITERATURE. See **LITERATURE**, subhead *Greek Literature*.

GREELEY, COLO., founded in 1870, and named for Horace Greeley, is the county seat of Weld County, fifty-two miles northeast of Denver, on the Union Pacific and the Colorado & Southern railroads. There is an emergency airport. The city is in the midst of an agricultural region, and has sugar-beet and canning factories. The State Teachers' College is here, and there are two hospitals, a library, a Federal building, a courthouse, and a radio station. Population, 1920, 10,883; in 1930, 12,203.

GREELEY, HORACE (1811-1872), probably America's most famous editor, was born in Amherst, N. H. He was employed first as a farm laborer, and then as a compositor, and in 1831 he went to New York, where, after an unsuccessful attempt to start the *Morning Post*, the first penny paper, he commenced in 1834 to issue the *Weekly New Yorker*, which ran for seven years. The *Log Cabin*, another weekly, established by him in 1840, reached a circulation of 80,000 and gave him a reputation which ensured the success of his *Daily Tribune*, founded in 1841 and edited by him till his death. In 1848 he was

elected to Congress. In 1851 he visited Europe, and was one of the jurors in the great exhibition of that year in London.

He was an earnest antislavery worker, though not an abolitionist, strictly speaking. When the South threatened to secede, he said that the people of any state had the right to withdraw, but he did not believe the votes for secession were fair expressions of the people's will, and he therefore was a firm supporter of President Lincoln. At the close of the war, he advocated a general amnesty and universal suffrage, and he signed the bond of Jefferson Davis, securing his release. In 1872 he was nominated for the Presidency by the Liberal Republican party, and was supported by the Democrats, the Greenback party and many anti-administration Republicans, but was defeated by President Grant. The strain of electioneering and the death of his wife brought on an illness of which he died before the count of the electoral vote. Chief among his literary works are his *Hints Toward Reforms, History of the Struggle for Slavery Extension, The American Conflict and Recollections of a Busy Life*.

GREELY, ADOLPHUS WASHINGTON (1844-1935), an American soldier-explorer, born at Newburyport, Mass. He was a volunteer in the Civil War and was made captain and brevet major of volunteers. In 1868 he was placed in the signal service, and between 1876 and 1879 constructed 2,000 miles of military telegraph in the West. In 1881 he conducted an expedition to the Arctic regions, reached 83° 24', the farthest point reached up to that time, and made many valuable geographical discoveries. Of twenty-five men, only Greely and six others survived until the summer of 1884, when they were rescued by a relief party, under Capt. W. S. Schley. In 1886 he published *Three Years of Arctic Service*, and in 1887 he was made chief of the signal service, with rank of brigadier-general. Thousands of miles of wire and wireless telegraph were built under his direction in China, Cuba, Porto Rico and the Philippines between 1898 and 1905. He was the author of *Reminiscences of Adventure and Polar Regions of the Twentieth Century*. See NORTH POLAR EXPLORATION.

GREEN, one of the colors of the solar spectrum, and one of the most widely-distributed colors in nature. Nearly all grass and foliage are green: many tropical birds and butterflies are green, and there are

numerous green minerals. Green is artificially made by combining or mixing blue and yellow. In this way some green pigment is prepared, though most of the green paints and dyes, such as Paris green, emerald green and imperial green, are made by boiling copper acetate in a solution of a compound of arsenic and oxygen. Many of the green dyes which were formerly made from vegetable compounds are now made from coal tar.

Green has a symbolical significance in various connections. It is the sacred color of the Mohammedans and the national color of Ireland. In medieval art it signified repentance. Lincoln green was worn as a mark of distinction by the Scottish Highlanders.

GREEN, HETTY (1835-1916), the greatest woman financier in the world and during her lifetime the richest woman in the United States. She was left a large fortune by her father in 1865. In 1867 she married Edward H. Green, who died in 1902. Mrs. Green's wealth was largely in New York and Chicago real estate and in stocks and bonds of great corporations. She was a shrewed investor; her income was very large, yet she lived a life of such extreme simplicity as to provoke much comment.

GREEN, JOHN RICHARD (1837-1883), an English historian, born at Oxford. He was educated at Magdalen College and took holy orders. He preached for several years, meanwhile studying history. His *Short History of the English People* brought him fame. This work was subsequently expanded into the *History of the English People*, in four volumes, which was followed by *The Making of England*, a work for scholars. After his death, his wife, who had always aided him in his work, published his *Conquest of England*.

GREEN, WILLIAM (1873-), an American labor leader, born in Coshocton, O., of British parentage. At the age of eighteen he began work as a miner, and became active in union affairs. He served as Ohio district president and as international secretary-treasurer of the United Mine Workers, was sent as a delegate to three national Democratic conventions, and served in the Ohio senate, becoming its presiding officer. In the legislature he secured the enactment of the Ohio workmen's compensation act, a statute that was later adopted in many other states of the Union. In 1913 he was elected vice-president and a member of the executive committee of the American Federation of Labor;

his zeal and good judgment led to his choice as president of that organization on the death of Samuel Gompers (which see) in 1924.

GREENAWAY, KATE (1846-1901), a famous illustrator of children's books. She passed most of her life at Hampstead, London. She had excellent training in art and originated a style of representation which was charming for its simplicity, quaintness and grace. Her best-known works are *Kate Greenaway Little Folks' Painting Book*, *Mother Goose and Language of Flowers*.

GREENBACK PARTY. See **POLITICAL PARTIES IN THE UNITED STATES.**

GREENBACKS, the popular name given to the paper currency first issued by the United States government in 1862, during the Civil War. They were given the name because they were printed in green ink. There was no redemptive feature connected with greenbacks; they contained simply the government's promise to pay. Since then, other efforts have been made to issue like money. See **CURRENCY**; **FIAT MONEY**.

GREEN BAY, Wis., the county seat of Brown County, 113 miles north of Milwaukee, on Green Bay, at the mouth of the Fox River, on the Chicago, Milwaukee, Saint Paul & Pacific, Chicago & North Western, and the Green Bay & Western railroads. The city's harbor admits the largest lake steamers, and there is an extensive trade in lumber, grain, fish and other articles. The manufactures include paper, cheese, lumber products, furniture and canned goods. The city has Saint Joseph's Academy, for girls, a Carnegie Library, a museum, and a Federal building. There is mayor and council government for the city. An old Indian village was established on the shore of the bay, and the early French explorers here met the Indians for trade in fur. The first settlement was made in 1669. About 1816 Fort Howard was built on the west side of Fox River, and a settlement grew up around it. Green Bay was chartered as a city in 1854, and in 1896 Fort Howard was united with it. Population, 1920, 31,017; in 1930, 37,415, a gain of 20.6 per cent.

GREEN BRIAR, a greenish, prickly, climbing shrub of the United States and Canada, belonging to the smilax family. It has thick, broad-ribbed leaves and produces small clusters of flowers and decorative berries.

GREENE, NATHANIEL (1742-1786), a general of the American Revolutionary army, born at Patowomut, R. I. In 1774 he joined the Kentish Guards as a private and in May, 1775, was appointed brigadier-general and commander of the Rhode Island contingent in the army before Boston. Washington made him a major-general. At Trenton, Princeton, Brandywine and Germantown he led a division, and in the subsequent fighting held important commands and repeatedly distinguished himself. In 1780 he was appointed to the command of the southern army and succeeded, by turning repeated defeats to his ultimate advantage, in wresting Georgia and the Carolinas from the British. Among the American generals of the Revolutionary War, Greene ranks next to Washington as a tactician and field commander.

GREENHOUSE, a building, chiefly of glass, for housing plants. The older greenhouses were built merely to protect tender plants from the cold. When not sufficiently heated by the sun they were warmed by stoves during the cold seasons. One of the chief uses of a greenhouse to-day is to produce decorative plants and vegetables out of season. All of the large ones are heated by steam or hot water pipes, which insure a uniform temperature. A greenhouse in which a temperature higher than is necessary for the life of plants is maintained is called a *forcing house*, or *hot house*, and one which is used for the display of flowers, rather than for the growth of flowers, is a *conservatory*.

GREENLAND, a possession of Denmark and the largest island in the world. Australia, really an island, exceeds it in size, but it is classed as a continent. Greenland holds another distinction, also; it has thus far been of the least practical value to the world of all large bodies of land; except for very small mining and fishing industries, it is worthless. The total value of its exports is less than \$500,000 per year.

The area of Greenland is estimated to be 836,518 square miles; the population in 1930 was 16,630, of whom 450 were Europeans, the remainder Eskimos. The largest town, or settlement, is Sydproven; population, 900. Of the total area, 712,750 square miles are covered with ice, in some places to the depth of 2,000 feet. The island is 1,400 miles long and 690 miles in its greatest width.

The "white silence" of the Arctic prevails continuously over almost all of the island.

The winters, even in the habitable sections, are very severe. On the west coast the July temperature averages 50°. Freezing weather prevails throughout the southern portion of the island about 275 days in the year. During the short summer a few hardy vegetables are grown; nearly all foodstuffs are imported from Denmark.

There are several small mining regions, producing principally copper and iron ore. About fifteen other minerals in small quantities are found, among them being cryolite. The wild animals include the white bear, Arctic fox, musk ox, ermine and wolf.

The island was first visited by Eric the Red in 984. He named it Greenland, from the little fringe of summer vegetation he beheld on approach to the shore, and the next year he made the first settlement. At first an independent state, it became a territory of Norway in 1260, and about 1410 came into the union of Norway and Denmark. Norway neglected the island, but after many years Denmark took measures to reestablish the colony, and eventually acquired control.

GREEN MOUNTAIN BOYS, the name assumed by a body of soldiers from Vermont during the Revolutionary War. They were originally organized by Ethan Allen to oppose the claims of New York to the territory of Vermont, but they continued their organization throughout the Revolution, being responsible for some notable victories, including the capture of Ticonderoga and Crown Point and the winning of the Battle of Bennington. See ALLEN, ETHAN.

GREEN MOUNTAINS, a New England branch of the Appalachian system. They are a continuation of a range extending from near New Haven, Conn., to Canada, but are called Green Mountains only in Vermont. They are verdant with forests of evergreens, hence the name. Deposits of iron, slate, marble and copper abound. The highest peaks are Mansfield Mountain, 4,364 feet; Killington Peak, 4,241 feet, and Camel's Hump, 4,088 feet.

GREEN RIVER, a river of Kentucky, which rises near the center of the state, flows generally westward and northwestward and enters the Ohio River 200 miles below Louisville. It is about 300 miles long and is navigable for boats for about 200 miles.

GREENSBORO, *greens'bur o*, N. C., the county seat of Guilford County, eighty-one miles northwest of Raleigh, on the South-

ern, the Norfolk & Western, and the Seaboard Air Line railroads. There is an airport. The city is in a fruit, grain and tobacco-growing region and is near coal and iron mines. The industries also include cotton mills and the manufacture of silk dress-goods, milling supplies, hosiery, machinery, flour, brick and other articles. The city has Greensboro College (for women), North Carolina College (for women), the State Normal and Industrial College, Bennett College, and the State Agricultural and Mechanical College (for colored students), and other negro colleges. There is the O. Henry Hotel, named in honor of the writer; an O. Henry room on the second floor contains many pictures of him and a complete O. Henry library. The place was settled in 1808 and was chartered in 1870. Population, 1930, 53,569.

GREENSBURG, PA., the county seat of Westmoreland County, thirty miles southeast of Pittsburgh, on the Pennsylvania Railroad. The borough is in a coal mining region, has natural gas and contains coke ovens, iron, glass and steel works and other factories. Several private institutions for secondary education are located here. Population, 1920, 15,033; in 1930, 16,508, a gain of 10 per cent.

GREENVILLE, Miss., the county seat of Washington County, 140 miles south of Memphis, on the Mississippi River and on the Yazoo & Mississippi Valley and Columbus & Greenville railroads. There is an airport. The city is in a rich cotton region, has large cottonseed oil and lumber mills, cotton compresses, and a large river commerce. Population, 1930, 14,807.

GREENVILLE, S. C., the county seat of Greenville County, 153 miles northwest of Columbia, on the Southern, the Greenville & Columbia, the Charleston & Western Carolina and the Greenville & Northern railroads. There is also an interurban line. The city is an educational center and is the seat of Furman University, Greenville Woman's College and Sacred Heart Academy. The industries include textile mills, granite works, flour and cotton mills, fabricated steel, and other factories. The place was settled in 1784 and was incorporated in 1831. Population, 1920, 23,127; in 1930, 29,154, registering a gain of 26 per cent.

GREENVILLE, Tex., the county seat of Hunt County, fifty-six miles northeast of Dallas, on the Missouri, Kansas & Texas,

Louisiana, Arkansas & Texas, Southern Pacific, and the Saint Louis Southwestern railroads. The city is in an agricultural and stock-raising region and has an extensive cotton trade and large manufactories of rayon products, also stockyards, flour mills, machine shops and brickyards. It is the seat of Wesley college. Greenville was settled in 1844, was incorporated in 1875, and has adopted the commission form of government, with a mayor and two commissioners. Population, 1930, 12,407.

GREENWICH, *grin'ij*, or *green'ij*, ENGLAND, a metropolitan borough of London, situated in the County of Kent, on the right bank of the Thames, about five miles southeast of London Bridge. Through Greenwich runs the meridian from which geographers reckon the longitudes of the world, and it is the seat of a celebrated observatory (see below) and of the Royal Naval College. The buildings of the latter institution were originally used as a refuge for disabled seamen, such a hospital having been established in 1705 by Queen Mary, wife of William III. In one of the buildings Henry VIII, Mary and Elizabeth were born. Greenwich has extensive shipbuilding yards, docks, iron foundries and engineering works. Population, 1931, 100,879.

Greenwich Observatory. This, the leading observatory in England, and one of the finest in the world, is under control of the Admiralty. It was founded in 1675 by Charles II, and is situated on a hill in Greenwich Park. Every day, exactly at noon, the time is flashed by electricity from the observatory clock to all parts of the British Isles. See **LONGITUDE AND TIME**.

GREGORIAN CALENDAR, the calendar as reformed by Pope Gregory XIII, in 1582. The *Gregorian year* is the ordinary year, as reckoned according to the Gregorian calendar. See **CALENDAR**.

GREGORY, the name of sixteen Popes. Two antipopes (which see) were also named Gregory.

Gregory I (540-604), called The Great, was born at Rome, of noble family, and was educated for the law. He became a member of the Senate, and was made prefect of Rome in 573. On receiving his inheritance he began founding monasteries and eventually took monastic vows. The sight of beautiful Anglo-Saxon youths on sale one day in a market place aroused in him a desire to go to England as a missionary. Pope Benedict I and his successor, Pope Pelagius II, thought he

was needed nearer home. On the death of Pelagius, Gregory, who had been papal secretary, unwillingly became Pope. He proved a wise administrator and was active in missionary enterprise, worked laboriously to advance monasticism and enforce clerical celibacy and organized the ritual and services of the Church. His writings consist of a treatise on Pastoral Duty, Letters and Scripture Commentaries.

Gregory VII, called Hildebrand, was Pope from 1073 to 1085. He believed that the Pope, when sovereigns misruled, should be the political, as well as ecclesiastical, authority. He prohibited traffic in sacred things and the marriage of priests and abolished lay investiture, the only remaining source of the authority of princes over the clergy of their dominions. This last act brought him into conflict with Henry IV. Gregory, after deposing several German bishops who had bought their offices of the emperor, and excommunicating five imperial councillors concerned in this transaction, summoned the emperor before a council at Rome to defend himself against the charges brought against him. Henry then caused a sentence of deposition to be passed against the Pope by a council assembled at Worms. The Pope, in return, excommunicated the emperor, and Henry, finding himself in difficulties, went to Italy, submitted at Canossa (1077) to a humiliating penance and received absolution. Gregory says that the emperor, "having laid aside all belongings of royalty, wretchedly, with bare feet and clad in wool, continued for three days to stand before the gates of the castle" before the pope would admit Henry to his presence. After defeating Rudolph of Suabia, however, Henry caused the Pope to be deposed by the Council of Brixon and caused an antipope, Clement III, to be elected in 1080, after which he hastened to Rome and placed the new Pope on the throne. Gregory passed three years as a prisoner in the castle of Saint Angelo, but was finally liberated and died in retirement at Salerno. His dying words were, "I have loved justice and hated iniquity; therefore I die in exile."

Gregory XIII (1502-1585) was born and educated at Bologna. He settled in Rome in 1529, and was one of the theologians of the Council of Trent. On his return to Rome he was made a cardinal, and in 1572, on the death of Pius V, was elected Pope. He was a patron of education, and many of the colleges in Rome were wholly or in part endowed by him. A notable event of his pontificate was a change in the calendar (see **Gregorian Calendar**). He did much to strengthen the Jesuit Order.

Gregory XV (1554-1623) was born at Bologna. During his pontificate the Congregation for the Propagation of Catholicism was established, and the present method of conducting the Papal Conclave was instituted.

Gregory XVI (1765-1846), a Venetian, was, before becoming Pope, a distinguished oriental scholar and teacher of theology. In 1826 he was made cardinal prefect of the Propaganda

and in this capacity made an agreement with the Netherlands regarding Roman Catholic citizens, regulated Church matters in the United states and secured for the Catholics in Armenia emancipation from the sultan. In 1831 he was made Pope, and during his pontificate he continued to extend the power and influence of the Church. He was a liberal patron of the arts and sciences.

GRENADA, *gre nah'dah*, an island of the British West Indies, northwest of Trinidad, belonging to the Windward group. It embraces an area of 133 square miles. The island is traversed from north to south by an irregular mass of volcanic mountains, attaining an elevation at Mount Catherine of 2,750 feet above sea level and having lateral branches of lower hills. The valleys between these contain alluvial tracts of great fertility, and rivers and rivulets are numerous. Cocoa and spices stand first among the exports. The island has a lieutenant-governor and a local legislature consisting of fifteen members. The capital is Saint George.

Grenada was discovered by Columbus in his third voyage in 1498 and was colonized about the middle of the seventeenth century by the French. In 1762 it was taken by the British, and though recaptured by the French in 1779 it was restored to Great Britain in 1783. Population, 1932, 78,662.

GRENADE, *gre nade'*, a small hollow ball of iron or other metal about two and one-half inches in diameter, filled with high explosive and bullets and fired by a fuse, so as to cause it to burst when thrown among the enemy. The term was first used by Du Billey, in reference to the siege of Arles (1536). Until about the end of the seventeenth century, when musketry became common, soldiers of the line were trained to throw grenades by hand; hence the name *grenadier*. During the World War (1914-1919) the grenade was a powerfully offensive weapon, and again it became a hand implement.

GRENFELL, SIR WILFRED THOMASON (1865-), a British medical missionary, noted for his self-sacrificing labors among the fishermen of Labrador and northern Newfoundland. He was born at Parkgate near Chester, England. He was educated at Marlborough and at Oxford and later studied at London Hospital. Sir Frederick Treves, one of his teachers, advised him to enter service with the Royal National Mission for Deep Sea Fishermen; he spent

three years with the fishermen of the North Sea as a medical missionary, accompanying them on their cruises from the Bay of Biscay to Iceland.

In 1892 he began work in Labrador and Newfoundland. Here he established hospitals, orphanages and various other institutions for the benefit of the fisherfolk. In his hospital ship, the *Strathcona*, he voyaged up and down the coast, stopping at villages and ministering to the people. His homes and industrial schemes have been of untold value to underprivileged populations.

His writings and lecture tours in Canada, America and England attracted wide attention and brought in funds needed for his undertakings. He was knighted in 1927. His writings include *Vikings of Today*, *The Harvest of the Sea, Labrador; the Country and its People*, *Adrift on the Ice-Pan*, *A Labrador Doctor*, *Northern Neighbors*, *Religion in Everyday Life*, *Forty Years for Labrador*, and *The Romance of Labrador*.

GRESHAM'S LAW, an economic principle, first announced by Sir Thomas Gresham, to the effect that when two different forms of money are in use, the one of lesser intrinsic value will always drive the one of greater value from use. Striking instances of the working of this law are found in Mexico and other Spanish American countries, where paper money has caused the disappearance of coins. In the United States comparatively few silver dollars are in general circulation, but this disfavor is due to their bulk.

GRET'NA GREEN, a village in Dumfriesshire, Scotland, nine miles north of Carlisle, and just across the English border. For nearly a century runaway-couples from England went there to be married, under the lax marriage laws of Scotland which required the pair merely to make mutual promises in the presence of witnesses. Parliament put a stop to such marriages in 1856 by an act declaring that a marriage contracted in Scotland should not be valid unless one of the parties had resided in Scotland twenty-one days preceding the marriage. To-day any favored place for tying the marriage knot is called a *Gretna Green*.

GREVY, *gra ve'*, JULES (1813-1891), a French statesman, a president of the French Republic. He held several public offices during his early life, and in 1848 he was made a member of the National Assembly. After the

proclamation of the Second Empire, he retired from political life and won a high reputation at the bar. When the Republic was declared, he was again returned to the National Assembly and became in 1871 its president. On the resignation of President McMahon in 1879, Grévy was chosen president of the Republic for seven years, and in 1886 he was reelected. He resigned in December, 1887.

GREY, ALBERT HENRY GEORGE, Earl (1851-1917), British colonial administrator, educated at Harrow and Trinity College Cambridge, where he graduated with honors. He was a Liberal member of the British Parliament from 1880 to 1886, administrator of Rhodesia, 1896-1897, and a director of the British South African Company, 1898-1904. From 1899 to 1904 he was also lord-lieutenant of Northumberland. In 1905 he succeeded Lord Minto as Governor-General of Canada. He returned to England in 1911. (For portrait, see article GOVERNOR-GENERAL.)

GREY, CHARLES, SECOND EARL (1764-1845), an English statesman, educated at Eton and at Cambridge. At the age of twenty-two he became a member of Parliament for Northumberland. From the first he was deeply interested in the question of Parliamentary reform, and several times presented petitions for reform. In 1806 Grey was made Lord of the Admiralty, and on the death of Fox became Secretary of State for Foreign Affairs and leader of the House of Commons.

The death of his father in 1807 raised him to the House of Lords, and from this time to 1830 he headed the Whig opposition in the House of Lords and especially opposed the proceedings against Queen Caroline. On the accession of William IV in 1830 and the retirement of the Wellington ministry, Grey was made prime minister and immediately took up the old question of Parliamentary reform. He at once began the struggle to put through a reform bill which should equalize suffrage and do away with the so-called "rotten boroughs." Twice the bill passed the Commons and was rejected by the Lords. Grey demanded of William IV that he create enough new peers to put the bill through. William consented, but the threat of such action was sufficient to turn the vote, and on June 4, 1832, the Reform Bill was passed.

GREY, EDWARD, VISCOUNT GREY OF FALLODON (1862-1933), an English statesman, since 1905 one of the foremost figures in European diplomacy. As Secretary of State for Foreign Affairs, he conducted many delicate diplomatic negotiations in the decade preceding the outbreak of the World War, and it was he who delivered the ultimatum to Germany regarding the violation of Belgium's neutrality.

Grey had always been a conspicuous advocate of closer relations with foreign countries, and was instrumental in forming the alliance between Great Britain, France and Russia (see TRIPLE ENTENTE). In 1912 he took the lead in attempting to end the Balkan War by a conference of delegates. Grey was first elected to Parliament in 1885, and served without interruption until 1916, when failing eyesight and the succession of Lloyd George as Prime Minister caused his resignation as Foreign Minister. The same year he was created a viscount. In 1928 he was appointed Chancellor of Oxford University.

GREY, *gra*, LADY JANE (1537-1554), England's unhappy "nine days' Queen." She was the daughter of Henry Grey, afterward Duke of Suffolk, and granddaughter of Henry VII. She was married to Lord Guilford Dudley, son of the Duke of Cumberland, in 1553. In the same year Edward VI, on his deathbed, named Lady Jane Grey his successor, being persuaded by Cumberland that if the crown descended to Mary the work of the Reformation would be undone. Lady Jane accepted the dignity with the greatest reluctance. Nine days after after she was proclaimed queen, Mary's claims were officially recognized. Lady Jane was confined to the Tower of London and in February, 1554, after much official hesitation, she and her husband were beheaded.

GREY, ZANE (1875-), an American novelist, born in Zanesville, O., and educated at the University of Pennsylvania both in dentistry and the liberal arts. He practiced the profession of dentistry in New York City for five years, then abandoned it for a literary career. Grey became a prolific writer (after 1904), his books numbering about fifty. Nearly all of his work is fiction, but he published two in serious vein, *The Last of the Plainsmen* and *Zane Grey's Book of Camps and Trails*. Several of his books were purchased by studios to become the basis of moving pictures.

GREYHOUND, a long, lean dog, distinguished by long muzzle, very low forehead, short lips, thin and long legs, small muscles and contracted abdomen. There are several varieties, as the Irish, the Scottish, the Russian, the Italian and the Turkish. The common greyhound is universally known as the fleetest of dogs. They pursue their quarry by sight, not by scent. The name appears to have no reference to the color, but is derived from the Icelandic *grey*, a dog. The chief breeds are the Newmarket, the Lancashire and the Scotch. See DOG.

GRIEG, *greeg*, EDVARD HAGERUP (1843-1907), one of the most famous of Scandinavian musicians, was born at Bergen, Norway. He studied piano and composition at Leipzig and Copenhagen, and later made successful tours as a concert pianist, visiting Italy, Germany and England. Grieg founded a musical union in Christiania in 1867, for the performance of Scandinavian music, and was its conductor until 1880. In 1888 he made his first appearance as conductor of the Philharmonic Concert in London, and at this time his wife sang and interpreted some of his songs, to the delight of the audiences. Talented as he was as pianist and conductor, Grieg will be remembered as a composer. His themes are drawn from Norwegian folklore, and the music has the vigor and enthusiasm of Scandinavia without its crudities. He retains the classic forms of composition, but expresses in his music his own individuality and his love of beautiful melody. Grieg attempted no large forms; he was most at ease in the shorter pieces for piano and orchestra. His most famous work is the *Peer Gynt Suite*. Other compositions include the overture *Im Herbst*, *Concerto in A Minor* (for piano) and *Elegiac Melodies*.

GRIFFIN, *grif'in*, a fabulous creature of the days of myths, known to modern peoples through the many references to it in literature and in the art of the centuries. It was in the imagination of the ancients half bird and half animal—with the head, beak and wings of an eagle and usually the body and legs of a lion. Often the parts were reversed, the head being that of a tiger or other fierce member of the cat family, with horns.

GRIMM, JAKOB LUDWIG (1785-1863) and WILHELM KARL (1786-1859), the brothers Grimm, as they are generally called, two German scholars who are best known as the

joint compilers and authors of a book of fairy tales. Both were born in Hanau, Germany, and were educated at the University of Marburg. Both were banished in 1837 for protesting against the abolition of the constitution by the king of Hanover, but were later recalled and became professors in Berlin. The two brothers worked together until the death of Wilhelm, devoting their labors to an investigation of the earlier language, poetry and laws of Germany. Jakob wrote a *History of the German Language*, a *German Grammar*, *German Mythology* and *Origin of Language*. Together the brothers compiled a *German Dictionary*; and by collecting from old manuscripts and books and by word of mouth the popular legends and fairy tales of their country, they laid the foundation for a science of folk lore. Their nursery tales have made them known the world over.

Grimm's Fairy Tales. These stories, although they were put into a book only about a hundred years ago, are very, very old. In fact, they have been told by German mothers to their children for centuries. Of course, no one knows just when they originated, or where; they probably were altered in the telling as they were handed down from generation to generation. In the first half of the last century the two Grimm brothers decided to collect the interesting unwritten folk tales of their native land, so they went out over the country prevailing upon the old people to tell them the stories they had heard as children. *Rumpelstiltskin*, *Tom Thumb*, *Snow White*, *Hänsel and Gretel* and *The Goose Girl* were among the stories that were told to them. They wrote down all the stories just as they were told and arranged them later in a book and called them *Grimm's Fairy Tales*. The fairy tales which these two German scholars collected were translated into many languages and to-day they are read by the children of every land. Their charm is perennially fresh, and they will probably be eagerly read by boys and girls, and older people, also, who love good stories for hundreds of years to come.

GRINDSTONE, a circular stone used for sharpening edged tools and smoothing surfaces. Grindstones are made from blocks of sandstone, which are fashioned into the desired shape and size. The stone is mounted on an axis, which passes through the center and is supported at each end on a frame.

Small grindstones are frequently turned by hand or foot, but larger ones are operated by machinery. Those used in factories often weigh several tons. The best material for grindstones is found near Berea, Ohio. Artificial grindstones of small size are made from emery and carborundum. The latter ranks next to the diamond in hardness.

GRIPPE, *grip*, (French, *La Grippe*), the name commonly applied to an infectious disease that frequently appears in epidemics during cold, damp seasons. It is described under the heading INFLUENZA.

GRIGUALAND, *gre'kwah land*, EAST and WEST, two small provinces in South Africa, near Natal and the old Orange Free State, now parts of the British South African possessions. East Griqualand has an area of 7,594 square miles, and a population of 249,000 people, including 7,900 whites. West Griqualand has 15,197 square miles and a population of 108,500, of which 32,600 are whites. The capital of the former is Kokstad; of the latter, Kimberley, famed for its diamond mines. See **KIMBERLEY**.

GRIS-NEZ, *gre na'*, CAPE, a headland of France, the nearest point of the French shore to that of Britain, the distance being barely 21 miles.

GRISTLE, *gris'l*. See **CARTILAGE**.

GROMWELL, a genus of plants of the borage family. There are about forty species, of which eight or ten are found in the United States. The *field gromwell*, common along roadsides, grows to a height of one foot or more. It has broad, pointed leaves, downy beneath, and the flower has a funnel-shaped corolla. Other names by which the plants are known are *wheat thief*, *red root* and *stone-seed*. The plants bloom in the summer, and their seeds, which are of stony hardness, are often mingled with the seed of grains. Some yield a dye which is similar to the alkanet.

GROSBEAK, *grose'beek*, a general name for a number of different birds whose beaks are large in proportion to the size of their bodies. In the United States the name is applied to a group of handsome finches that have strong, thick bills, which enable them to crack open even the stones of cherries. The *rose-breasted grosbeak*, which is one of the prettiest, has a sweet, simple little song. The male is largely black, with white lower parts and a beautiful rose-red breast. In the Southern states is found the *blue grosbeak*; to the north and west the *evening grosbeak*,

which sings at night; and in the pine and juniper woods of Canada, the *pine grosbeak*.

GROTIUS, *gro'shi us*, or **DE GROTT**, Hugo (1583-1645), a distinguished Dutch scholar, the founder of the science of international law. In him were united a profound theologian, a brilliant jurist and an acute thinker. He became chief magistrate of Rotterdam, but was banished as an opposer of strict Calvinism. Later he was Sweden's ambassador to France. He wrote extensively and brilliantly, and his great work *On the Law of War and Peace* is still used as a textbook in international law.

GROUNDHOG. See **WOODCHUCK**.

GROUND IVY, a creeping weed of the mint family. The stems are hairy, and the leaves are rough, with scalloped edges. The small, purplish-blue flowers are funnel-shaped. The green part of the plant has a slightly pungent taste and odor.

GROUND SQUIRREL, the name of a genus of squirrels, somewhat resembling the marmot. They differ from the common



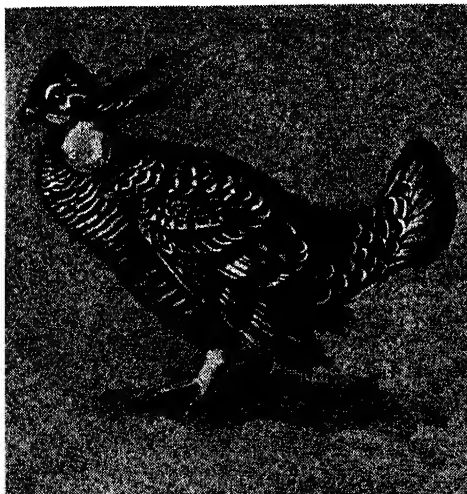
GROUND SQUIRREL

squirrel in that they possess cheek pouches and retreat into burrows. They are well known in America, but species are also found in Asia and Africa. See **CHIPMUNK**; **GOPHER**.

GROUSE, a group of wild birds, related to the domestic fowls. Grouse usually live on the ground, and they always nest there. During a part of the year they live in families and confine themselves to forests and partially barren regions, where they feed on berries, buds, leaves and insects, which they often uncover by scratching. When hunted, it is their habit to lie hidden until their enemy is almost on them and then fly off rapidly with a great whirring of wings.

The male birds become fierce in the breeding season and, after dancing, drumming and performing various antics before the hens, they fight viciously, the victor mating with the whole flock of hens; as soon as the

females begin to sit, the male leaves them alone to take the entire care of their offspring. The eggs number from eight to fourteen.



GROUSE

The young are very sprightly and leave the nest almost as soon as they are hatched, and on the least alarm they hide themselves skilfully.

In the United States and Canada there are a number of different species, chief of which is the *ruffed grouse*, *partridge*, or *pheasant*, as it is called according to locality. This bird is of a brownish color, with a light-spotted breast, and trim, plump form. On the neck of the male are two large patches of black feathers, which open out, fanlike, at times.

The ruffed grouse are considered among the finest American game birds. Most of the states limit to a few months the period during which they may be hunted. The *prairie chicken*, another grouse, once was exceedingly common throughout the Central States, but it has been almost exterminated. The sound the prairie chicken makes is a loud, hollow booming that is almost as peculiar as the drumming of the ruffed grouse. There are a number of different species of the grouse in Europe, where they are favorites with sportsmen.

Related Articles. Consult the following titles for additional information:

Partridge Pheasant Prairie Chicken

GRUB, any thick, wormlike larva (young) of an insect, such as a beetle. See INSECTS.

GRUNTER. See GURNARD.

GUADALAJARA, *gwah dah lah hah'rah*, Mexico, capital of the state of Jalisco, situ-

ated in the fruitful valley of Atemajac, on the Rio de Santiago. It is the second city in the republic in size and in importance, has a fine cathedral, a university, a mint, several convents, an art academy, a library and a number of literary and scientific institutions. The Degollado is the largest theater but one in America. Paper, leather and Panama hats are manufactured, and the steel and glass industries are important. Population, about 1930, 184,826.

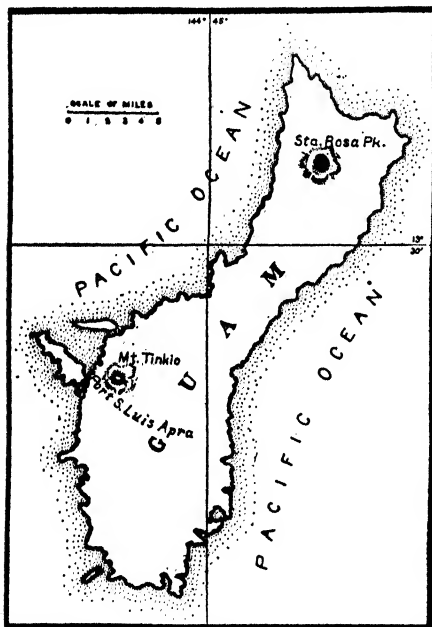
GUADALQUIVIE, *gaw dal kwiv'ur*, an important river of Spain, which rises in the frontiers of Murcia, traverses Andalusia from northeast to southwest, passing the towns of Cordova and Seville, and thereafter flowing southwest, falls into the Atlantic. Its course is 250 miles, of which seventy are navigable.

GUADALUPE HIDALGO, *gwah da loo' pay he dal'go*, TREATY OF, the treaty between Mexico and the United States at the close of the Mexican War. It was signed February 2, 1848, at Guadalupe Hidalgo, and was ratified the following May. By it the Rio Grande was established as the eastern, and the Gila and Colorado rivers as the western boundary between the two countries. The United States agreed to pay Mexico \$15,000,000 and to assume the payment of all claims, not exceeding \$3,250,000, held by American citizens against Mexico.

GUADELOUPE, *gaw de loop'*, a French West Indian colony, in the Lesser Antilles, consists of two islands, with only a narrow intervening channel. The western and larger portion is Basse-Terre, or Guadeloupe proper, twenty-seven miles long and about fifteen miles broad. It is of volcanic formation, the culminating point being La Soufrière, 5,018 feet high. The eastern portion, called Grande-Terre, is nearly thirty miles long by ten to twelve miles broad. It is generally flat and of coral formation. The climate of Guadeloupe is hot and unhealthy, with a humid atmosphere, and hurricanes are frequent and destructive. The soil is fertile and is covered with fine forests. The chief articles of cultivation are sugar, coffee, cacao, bananas and manioc. The chief towns are Basse-Terre, the capital (9,275 inhabitants), and Pointe-a-Pitre (population, 30,465). After belonging at various times to the English and the French, these islands were ceded to France in 1814. Population, 1932, 267,407.

GUADIANA, *gwah de ah'nah*, a river of Spain, which rises in New Castile, flows first northwest, then southwest, into Estremadura; on reaching Badajoz it begins to form part of the boundary between Spain and Portugal, and it finally reaches the Atlantic, below the town of Ayamonte. It has a length of about 520 miles, of which only thirty-five are navigable.

GUAM, *gwahm*, an island possession of the United States, in the Ladrone group, in the western Pacific Ocean, about 13° north latitude, and twenty degrees directly east of the Philippine Islands. Guam is thirty miles



long and from four to nine miles wide. It is governed by an officer of the navy and is garrisoned by the marine corps. The natives, about 19,000 in number, are of Malay origin. They have great respect for authority, are docile, and their great ambition is to own land. They are rapidly becoming Americanized in their habits, dress, mode of living and ideals.

The chief products are live stock, copra, corn, rice, tobacco, sugar, sweet potatoes, and most tropical fruits. The island is visited frequently by disastrous typhoons, particularly during October and November. The capital is Agana (population 11,000). The island was ceded by Spain at the close of the Spanish-American War (1898).

GUAN, *gwahn*, a bird related to the grouse and partridge, a native of Central and South America. The birds of one species, the *chachalaca*, range as far north as Texas. The guans are about thirty inches



GUAN

long, and the plumage is black, glossed with green. Their heads are often crested and their tails long. Many of them have pendant wattles. They live in flocks, except during the breeding season, when they separate in pairs, and they feed upon fruits and seeds.

GUANACO, *gwah nah'koh*, one of a species belonging to the camel family, related to the llama and alpaca, and found in Chile and Patagonia. The animal attains a height of nearly four feet at the shoulders, and is extremely swift and surefooted. The hair is long, reddish and woolly, and the skin is much used for clothing and tents. The natives use the flesh for food, and they drink the milk of the domesticated animals. See ALPACA; LLAMA; CAMEL.

GUANAJUATO, *gwah nah whah'toh*, MEXICO, capital of the state of the same name, 165 miles northwest of Mexico City is situated in a narrow defile, hemmed in by mountains, at the height of 6,800 feet above the sea. It has steep, irregular streets. The most important buildings are the cathedral, a college, a gymnasium and a mint. The city is located in the vicinity of extensive silver mines. The leading manufactures are silverware, pottery, soap and chemicals. Population, 1930, 45,500.

GUANO, *gwah'no*, a fertilizer consisting of the decomposed excrement of sea birds

that collect in large colonies. The largest deposits were formerly on the Chinchá Islands off the coast of Peru, but these have been entirely exhausted, though smaller deposits are found on neighboring islands. In 1918 a valuable guano deposit was discovered on Pelican Island, Lake Miquelon, Alberta. There are other valuable deposits in the Galapagos Islands of Ecuador. Guano has also been found in many other parts of the world, but seldom in large enough quantities to be valuable, as other fertilizers have become available. See FERTILIZERS.

GUARANTEE, *gar an tee'*, in law, a written promise by which a person binds himself to answer for the failure of another. No person is liable on any special promise to answer for the debt, default or miscarriage of another person, unless a written agreement, or some memorandum in writing for such purpose, shall be signed by the promiser or some other party lawfully authorized by him. It is a general rule that the guarantor shall not be bound beyond the express words of the engagement.

GUARD, NATIONAL. See NATIONAL GUARD.

GUARDIAN, *gahr'de an*, in law, the custodian of a person incapable of directing himself; especially, the custodian of a person under twenty-one years of age. A guardian is not allowed to reap any benefit from his ward's estate, but must account for all profits. He can invest the money of his ward in real estate only by order of the court, and he can convert real estate into personal property only by a similar order. If he spends more than the interest and profits of the estate in the maintenance and education of the ward, without permission of court, he may be held liable for the principal thus consumed. He is entitled to the care and custody of the person of his ward. Guardianship lasts until the ward has attained legal age.

GUATEMALA, *gwah te mah'lah*, the largest and most important of the Central American republics, and the most northerly, has an area of 45,452 square miles and a population of over 2,245,000. The climate is diversified, owing to the elevation of the central and southern regions. Its tropical location gives it naturally warm, moist weather, but the highlands are cooler, and more thickly settled than the lowlands. The lowlands are unsuited to white people, but the natives thrive fairly well in the humid atmosphere, despite ever-threatening fevers.

Over three-fifths of the people are Indians; the remainder are Spanish and mixed breeds, the latter predominating. The foreign population is small. There is no state religion, and there is freedom of worship, but nearly all the people are Roman Catholic. The capital city, Guatemala, was completely destroyed by earthquakes on January 3 and 4, 1917, but has since been almost entirely rebuilt (see GUATEMALA, below). Other principal cities are Quezaltenango (30,000), Coban (26,800), and Zapata (18,000). Puerto Barrios, on the Caribbean coast, is the chief banana port.

The soil is fertile; the principal crops are coffee, bananas, sugar, corn, beans and rice. Chicle, used in the manufacture of chewing gum, is exported in large quantities to the United States. Crop diversification is encouraged by agricultural experiment stations maintained by American interests.

The republic was established in 1847 after the country had been for several years a member of the Confederation of Central America. The present constitution came into effect in 1928. There is a National Assembly (one member for every 30,000 inhabitants) elected by universal suffrage, and a Council of State, partly chosen by the Assembly and partly by the President. The President's term of office is six years. See CENTRAL AMERICA.

GUATEMALA, the capital of the republic of the same name, and its chief city. It is situated on a plateau about 5,000 feet above sea level. Almost completely destroyed by earthquakes in 1917, it is almost completely rebuilt. Its streets and parks are spacious; it abounds in monuments of the early Spanish occupation, including a fine cathedral, and the University of Guatemala. It has two radio broadcasting stations. Population, 1933, 134,400.

GUAVA, *gwah'vah*, the popular name for certain small tropical trees with square branches, egg-shaped leaves and large white flowers. The fruits are fleshy berries, which are usually apple-shaped or pear-shaped. The pulp is of an agreeable flavor, and a delicious jelly is made from it. Florida and California have profitable yields of the fruit, the annual crop being valued at over \$11,500. The species cultivated in these states is the *lemon guava*, which grows about twenty feet high. An illustration of the guava appears on page 1590.

GUAYAQUIL, *gwah ya keel'*, ECUADOR, the most important seaport of the country, is situated on the west bank of the Guayas River, forty miles from its mouth. This

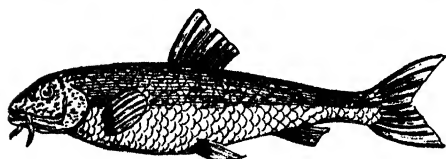


GUAVA

river empties into the Gulf of Guayaquil, an arm of the Pacific Ocean. The city has an annual export trade valued at more than \$15,000,000, and an import trade exceeding \$7,000,000. Its exports consist chiefly of cacao, coffee, quinine, hides, gold and silver, Panama hats and ivory nuts.

The city has an unhealthy location on a low plain, and is divided into old and new parts. In the latter are the homes of the better class and the important business establishments. Guayaquil is a two-days' journey from Quito, capital of Ecuador. Connection is made by way of Duran, opposite Guayaquil, the capital and Duran being joined by a railroad. Guayaquil enjoys electric car and telephone service, and has telegraph, cable and steamer communication with various parts of the world. Its industrial establishments include shipbuilding yards, sawmills, textile factories and sugar refineries. Population, 1934, estimated 126,700.

GUDGEON, *gu'jon*, a fresh-water fish, belonging to the carp family, common in rivers



GUDGEON

of England. Neither jaw is furnished with teeth, but at the entrance of the throat there

are two triangular bones, which perform the office of grinders. These fish measure about six inches in length, and are marketed for the table.

GUEBERS, or **GUEBRES**, *ge'burz* or *ga'burz*. See **GHEBERS**.

GUELDER, *gel'dur*, **ROSE**, a name frequently given to the cultivated variety of the high-bush cranberry. On account of the shape and color of the flower clusters, it is sometimes called the snowball; the other name is derived from that of the Dutch province Guelderland, where, it is said, the plant grew originally. Cultivated varieties bear no fruit, but there is a wild guelder rose which produces pretty red berries.

GUELPH, *gwelf*, **ONT.**, in Wellington County, on the Speed River and the Canadian National and Canadian Pacific railways. It is the center of a very important stock raising section, with an annual Winter Fair. The river here has a fall of thirty feet, and furnishes power for many factories. Its manufactures include steel and wire goods, stoves, furnaces and steam-heating appliances, electric goods, engines, boots, shoes, and rubber goods, carpets, clothing and meat products. The Ontario Agricultural College and the MacDonald Institute of Domestic Science are located here. Population, 1931, 21,075.

GUELPHS AND Ghibellines, *gwelfs*, *gib'elinz*, the names of two great Italian political factions in the thirteenth and fourteenth centuries. The names are corruptions of the German *Welf* and *Waiblingen*, party designations in Germany in the war between Welf VI of Bavaria and Conrad of Hohenstaufen, to whom belonged the estate of Waiblingen. About the year 1200 the terms Guelph and Ghibelline came to denote, respectively, the Italian patriotic party, which demanded an Italy freed from German interference, and the imperial party, which supported the domination of the German emperors in Italy. After the fall of the Hohenstaufens, the Ghibellines became the partisans of aristocracy and the Guelphs were the partisans of democracy and liberty; but the designations came in time to denote mere family feuds.

GUERIN, *ga raN'*, **JULES** (1866—), an American artist born at Saint Louis, Mo. After studying in Paris he returned to America and developed a distinct style in colored magazine illustrations. His pictures, usually of architecture or landscape, are in flat

tones. The method is similar to that employed by present-day Japanese artists, though the effect produced is different. Mr. Querin received awards at the international expositions at Chicago, Paris, Buffalo and Saint Louis, and had charge of the decorations of the Panama-Pacific Exposition in 1914. He is a member of the National Institute of Arts and Letters.

GUERRIERE, *gair yair'*, **THE**, a noted English frigate in the War of 1812. See **CONSTITUTION**, **THE**.

GUEST, **EDGAR ALBERT** (1881-), a minor American poet and prose writer who through his natural ability achieved a reputation as the "poet of the plain people," a term applied by himself that the public should not estimate him too highly. He was born in England, was brought to the United States when ten years of age, and received only a high-school education. At the age of fifteen he became office boy on the Detroit *Free Press*, and never left that newspaper, passing to minor editorial positions and finally to authorship of a daily column of verse and prose sketches. His work is widely syndicated.

GUIANA. See **BRITISH GUIANA**; **DUTCH GUIANA**; **FRENCH GUIANA**.

GUIDO RENI, *gwe doh ra'ne* (1575-1642), a celebrated Italian painter, born at Bologna, the son of a musician. He studied music, but was allowed to follow his greater artistic bent. After his twentieth year he followed the ideals of the Eclectic, or Bolognese, school of painting, and became one of its chief masters. Artists of the Eclectic school advocated the bringing together of the best points of various systems. Guido Reni is particularly noted for the gentleness and sweetness of his characters. He was a good colorist and draughtsman, but lacked some of the originality that characterized other great artists. Among his most famous works are *Aurora*, *Magdalene*, *Michael Vanquishing Satan*, *Lot and His Daughters*, *Fortune and Rape of Helen*.

GUILD, *gild*, a society or association for carrying on commerce, a handicraft or some other undertaking. Such associations have been known from very early times in various countries, and they played a very important part in the Middle Ages. They often formed a bulwark against the oppression of the nobility and were thus conducive to the growth of municipal and civil liberty. In the

thirteenth century the German guilds of craftsmen obtained the right of defending by arms their own interests, and they became so powerful that persons unconnected with the trade were often glad to attach themselves to them. With the view of destroying the influence which they had acquired, emperors at different times abolished them by decree, but it was not until late in the nineteenth century that unrestricted freedom to practice any trade was established in Germany. In Great Britain trade guilds long possessed an importance which was mainly political. As the right of voting was involved in the membership of a guild, many persons acquired the rights of "freemen" by connecting themselves with some body of this kind. In England, these guilds had no legal right to prevent any man from practicing what trade he pleased. The guilds, or companies, of the city of London are still very important corporations, which give relief to poor and disabled members and also manage vast funds bequeathed for benevolent purposes.

The merchants' guild was composed of men who engaged in trade. This type of guild appeared in England shortly after the Norman Conquest when extension of trade interests occurred. It managed the trade monopoly of the borough and protected its members from the competition of strangers.

Religious guilds sprang up in England in the 12th century. Their regulations were much like those of the early-Anglo-Saxon guild. Members were cared for in old age and sickness. Hospitals and other public institutions were maintained. These guilds also undertook to carry out terms of bequests that called for repeated religious services or gifts to a church. They were brought to an end under Henry VIII. These guilds do not seem to have formed the precise model for modern trade, labor or religious organizations.

Many of the trades unions, especially in the United States, have somewhat of the character of the ancient guilds.

GUILDER, *gil'dur*, or **GULDEN**, *gool'den*, the monetary unit of Holland, having a value of 40.2 cents. The coin is also called florin (which see).

GUILLEMOT, *gil'e mot*, the name of several species of web-footed birds, belonging to the auk family. The birds inhabit the Arctic regions of both hemispheres and the colder parts of the temperate zone, migrating south in winter. They have straight, compressed

bills, covered with feathers as far as the nostrils; short, pointed wings, and short legs, far back under the body. They live principally on fish and build their nests on steep rocks near the sea. The bird lays but one egg, which is three inches long, pear-shaped and has a very hard shell. See *AVK*.

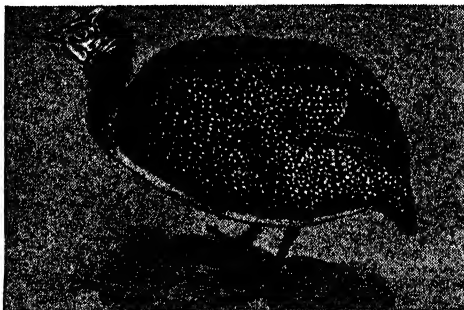
GUILLOTINE, *gil'lo teen*, an engine for beheading persons at one stroke, adopted by the National Assembly of France during the French Revolution. In this apparatus decapitation is effected by means of a steel blade, loaded with a mass of lead, and having a slanting edge. This blade slides between two upright posts, grooved on their inner sides. The victim's neck is confined in a circular opening between two planks, the upper one of which also slides up or down. A vivid description of the guillotine occurs in Dickens' *Tale of Two Cities* (see *FRENCH REVOLUTION*). Dr. Joseph Ignace Guillotin (1738-1814), for whom the machine was named, is popularly considered its inventor, but he merely suggested the revival of an apparatus that was in common use in Italy and Germany in the Middle Ages. In Scotland a similar instrument, the *maiden*, was used for executing noblemen as late as the seventeenth century. The guillotine is still employed in France for meting out capital punishment.

GUINEA, *gin'e*, a geographical term applied rather vaguely to certain regions along the western coast of Africa, including the bend of the Atlantic shoreline that forms the Gulf of Guinea. In its widest sense the term has embraced the region extending southward from the Senegal River to the vicinity of Cape Negro, but it is now usually restricted to colonial possessions of Portugal, France and Spain. Portuguese Guinea is a small coast colony of about 14,000 square miles adjoining the French colony of Senegal. French Guinea, 96,865 square miles, lies north of Sierra Leone. Both of the French colonies are now included in French West Africa. Spanish Guinea has an area of 10,810 square miles. See political map under *AFRICA*.

GUINEA, an old English coin worth twenty-one shillings, or about \$5.04. Guineas were first coined in the reign of Charles II (1663), of gold brought from Guinea; they bore the figure of an elephant. In 1817 the coin was withdrawn from circulation, being superseded by the sovereign. It is, however, still customary to estimate professional fees in guineas, and the name is occasionally

used in literature as a symbol for money. In Robert Burns's poem *For a' That and a' That* occurs the line—"The rank is but the *guinea's* stamp."

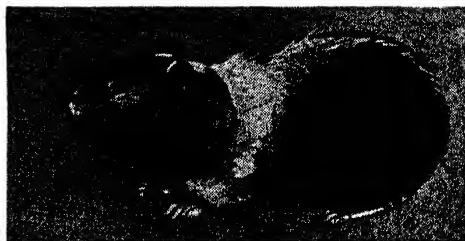
GUINEA FOWL, a genus of pheasants, originally all natives of Africa. The common



GUINEA FOWL

guinea hen, now well known as a domestic fowl, has slate-colored plumage, speckled with white spots that look like pearls. On top of the head is a horny growth, or helmet, similar to the comb of our farm poultry. As may be seen from the illustration, the guinea fowl has no feathers on its head and some other parts of the body. The female is a little smaller than the male and her helmet and wattles are less conspicuous. Guinea fowls are noisy and quarrelsome and therefore disagreeable to raise, but are of economic value because of their well-flavored flesh and their eggs. These fowls need scarcely any prepared food, as they like to pick up berries, seeds, etc., in the fields and woods.

GUINEA PIG, a tailless little animal, about six inches long, usually variously



GUINEA PIG

spotted with black, white and brown. It is in fact not a pig at all but a cavy, that is, an animal resembling in some respects rats and rabbits. Guinea pigs are timid little creatures that feed on vegetable food, and

they breed very rapidly. They are extensively used in bacteriological laboratories for the study of germ diseases; because they are clean and easily cared for they make attractive pets for children.

GUISE, *geez*, a distinguished ducal family of France, a branch of the House of Lorraine. Several of its members took an important part in French history. The family acquired great political influence on the accession to the French throne of Francis II, who had been married to Mary Queen of Scots, the granddaughter of the first duke of Guise. Among the most famous of the family was FRANÇOIS OF LORRAINE, Duke of Guise (1519-1563), who early distinguished himself in war, especially at Metz, which he successfully defended against the attack of Charles V. Under Henry II and Francis II he was the real ruler of France. On the death of Francis II he was driven from France, but was recalled to take charge of the armies against the Huguenots (Protestants). While preparing to besiege Orleans, the central point of the Protestant party, he was assassinated. His son, Henry I of Lorraine, third Duke of Guise (1550-1588), became the leader of the Catholic party on the death of his father and took a prominent part in the wars against the Huguenots. He was a leader in the massacre of Saint Bartholomew, and for sake of revenge he personally conducted the assassins to the house of Coligny, the Huguenot leader. After defeating the allies of the Huguenots, he advanced to Paris. Henry III, afraid of his power, forbade him to enter. Guise disregarded the command and was received with great enthusiasm by the people. Henry, fearing Guise would make himself king, invited him to a conference and had him assassinated.

GUITAR, *ge tahr'*, a stringed musical instrument, with a hollow body and a neck somewhat similar to that of a violin, used especially to accompany the voice. The modern, or Spanish, guitar has six strings, the three highest being made of gut, the three lowest, of silk, covered with fine wire. The tone is produced by vibration of the strings, from picking with the fingers and the pitch is regulated by pressing the wire against brass frets in the neck of the instrument, thus changing the length of the vibrating segment. The first, second and third fingers sound the three highest tones, the thumb the deepest,

and the little finger rests on the sounding board.

GUIZOT, *ge so'*, FRANÇOIS PIERRE GUILLAUME (1787-1874), a French historian and statesman. In 1805 he commenced legal studies at Paris, but gradually drifted into the literary profession. In 1812 he became professor of history at the Sorbonne. On the fall of the Empire he obtained several public offices, such as councilor of state and director-general of the departmental and communal administration. He lost his offices and his position at the Sorbonne, on account of his openly expressed political principles, but in 1829 he was permitted to resume his lectures. After the July revolution of 1830, he was appointed minister of the interior, but resigned in 1831. After the death of Périer, Guizot helped to form a coalition ministry, and he rendered great service as Minister of Public Instruction. He became ambassador at the British court in 1840, and in the next year became the real head of the government of which Soult was the nominal chief. He retained the office of Minister of foreign Affairs until 1848, and during that period he opposed all measures of reform. After the fall of Louis Philippe, Guizot escaped and fled to England. Henceforth he practically retired from public life. Among his numerous works may be mentioned *The History of Civilization in France*, *General History of Civilization in Europe*, *History of the English Revolution*, *Washington* and *The History of France from the Earliest Times to the Year 1789*.

GULDEN, *goo'den*. See **GUILDER**.

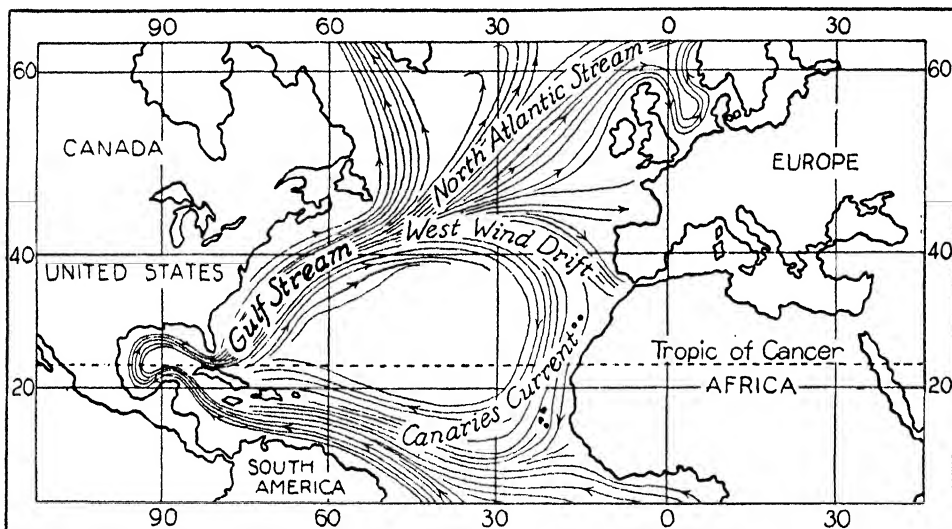
GULF STREAM, one of the most celebrated of the oceanic currents, so called because it issues from the Gulf of Mexico. It owes its origin to the fact that the westward-moving waters of the tropical portion of the Atlantic, encountering the eastward projection of South America, become divided into two currents, one setting southward along the Brazilian coast, and the other northward past the mouths of the Amazon and Orinoco, into the Caribbean Sea. It enters the Gulf of Mexico and thence emerges through the channel of Florida as



GUITAR

the Gulf Stream. Its course is next to the north and east, in a direction parallel to the coast of the United States, past Cape Hatteras, along the southern edge of the "great banks" of Nantucket and Newfoundland, after which it loses identity as a distinct current.

Stream on the temperature of Europe. If it possesses any *direct* influence, such must be extremely small, as the current is both too narrow and too shallow, and its slight amount of superior heat probably vanishes after it has passed Cape Hatteras. The relatively high temperature of western and north-



COURSE OF THE GULF STREAM

In the earlier part of its course, especially when rounding the extremity of Florida, the Gulf Stream forms a well-defined current, distinguished by its high temperature and its deep blue or indigo color. On account of the descent of the Polar, or Labrador, current along the coast in a direction opposite to that of the Gulf Stream, the water on its inland side is colder than that to the eastward of it. The difference of temperature between the Gulf Stream and this cold current sometimes amounts to 20° or 30°.

The velocity of the Gulf Stream varies with its course. Within the Florida channel it attains a mean velocity of sixty-five miles per day; this sinks to fifty-six miles off Charleston, becomes thirty-six miles to forty-six miles off Nantucket and twenty-eight miles to the south of the Newfoundland Banks; three hundred miles to the eastward of Newfoundland its movement is hardly perceptible.

At the bottom of the Florida channel the observed temperature is 34°, that of the surface from 80° to 84°. Geographers have greatly exaggerated the influence of the Gulf

Stream on the temperature of Europe. If it possesses any *direct* influence, such must be extremely small, as the current is both too narrow and too shallow, and its slight amount of superior heat probably vanishes after it has passed Cape Hatteras. The relatively high temperature of western and north-

western Europe must rather be referred to the general set of the tropical waters to the northeast, and to the warm winds blowing in the same direction. See OCEAN CURRENTS.

GU'LUCK, LUTHER HALSEY (1865-1918), an American specialist in physical education, who founded, in coöperation with his wife, the organization known as the Camp-Fire Girls (which see). He was born in Honolulu, and was educated at Oberlin Academy, at the Sargent Normal School of Physical Training and at the medical department of New York University. From 1903 to 1908 he directed physical training in the New York City public schools, and between 1908 and 1913 had charge of the department of child hygiene of the Russell Sage Foundation. Since 1913 he has been president of the Camp-Fire Girls. He wrote extensively on his special subject.

GULLIVER'S TRAVELS, a satirical romance by Jonathan Swift, the greatest of English satirists. Lemuel Gulliver, the hero of the book, at first a surgeon and afterwards a sea-captain, is wrecked off the island of Lilliput, land of Pygmies; he voyages to

Broddingnag, land of Giants; visits Laputa, a country of quacks and pretended scientists, and lastly journeys to a sort of Utopia where live the Houyhnhnms, which were horses endowed with superior intelligence. The work is an unrivalled satire on mankind. With certain parts omitted it is one of the most delightful books for children ever written.

GULLS, *gulz*, birds that live along the seacoast and on large bodies of waters of the interior, in almost all parts of the world. They are very graceful on the wing and are seen usually in large flocks, especially in the wake of steamers. They catch fish with great



GULLS

skill, but are quite content to follow ships or to hang about harbors, gathering in the refuse from sewers, buildings and shipping. Unlike terns, they do not plunge beneath the water, but pick food from the surface.

There are a great many species, many of which resemble one another so closely that the ordinary observer cannot distinguish between them. Their prevailing colors are white or bluish-gray, but black, slate color and brown are mixed in various ways in some species. The *great black-backed gull*, the *herring gull*, the *laughing*, or *black-headed*, *gull*, *Bonaparte's gull* and the *kittiwake gull* are common American species. The *lesser black-backed gull* belongs to Europe.

GUM, a general name applied to a variety of substances obtained from the sap which exudes from certain trees, such as the peach

and plum. Gums form non-crystalline, rounded drops, or tears, the purest varieties being transparent or translucent, usually pale yellow, but sometimes of a dark color. When dissolved in water, gum forms a thick, smooth fluid, which is more or less sticky. Some gums, such as gum arabic, dissolve in water; others, like tragacanth, are only partially soluble; all are insoluble in alcohol and are thus distinguished from resins. They have no odor and only a very faint taste. The different kinds of gum receive their names from the countries from which they are imported—as gum arabic, used in the manufacture of medicines, candy and glue; gum Senegal; Barbary gum and East India gum; and from their individual features—as cherry-tree gum and tragacanth, used as a mixing agent in pharmacy. *Gum resins* require both water and alcohol to dissolve them.

Related Articles. Consult the following titles for additional information:
Chewing Gum Gum Resins Resins

GUM ARABIC, a yellowish or reddish gum, gathered from several species of acacia trees that grow in Asia and Northern Africa. It is used in thickening ink and in making mucilage and pastes. See MUCILAGE.

GUMBO, a soup having a base of chicken stock and thickened with gumbo, or okra pods. Gumbo, or okra, is a plant of the hibiscus family, and has a high percentage of mucilage. The unripe pods are excellent for thickening, and gumbo is one of the most popular soups in the Southern United States. The plant is native to the West Indies.

GUMBOIL, an abscess in the gum, generally the result of toothache or of the presence of decayed teeth or stumps. A sore of this kind should be treated by a reliable dentist. Decayed teeth and stumps are usually removed, and the abscess is lanced.

GUM RESINS, *rez'inz*, solidified juices obtained from plants. They contain a gum, which is soluble in water, and a resin, which dissolves in spirits; any gum resin, therefore, is generally nearly soluble in dilute alcohol. In addition there are usually present essential oil and a variety of impurities. The gum resins have frequently a strong and peculiar taste and smell. They are solid, opaque and brittle, and are used chiefly in medicine. The common gum resins are aloes, asafoetida, gamboge, ammoniac and myrrh. See GUM; RESINS.

GUN. See CANNON; RIFLE; HOWITZER.

GUNBOAT, a term applied to small war vessels, fully armored and carrying guns as large as four-inch quick-firers, numerous smaller guns and machine-guns. Within their proper sphere of operation they have the efficiency of small cruisers; except for patrolling, where there is slight danger of resistance, the gunboat is outclassed.

GUNCOTTON, a highly explosive compound, made by soaking vegetable fiber in a mixture of nitric and sulphuric acids and allowing it to dry. Cotton is the fiber generally used, hence the name *guncotton*. Guncotton is used in the manufacture of celluloid, collodion and varnishes. Military guncotton is highly explosive and is used for charging torpedoes and in exploding mines. A form of guncotton known as *pyrocellulose* is used in making smokeless powder. See **TORPEDO**; **SUBMARINE MINE**.

GUNPOWDER, an explosive, consisting of a mixture of saltpeter, sulphur and charcoal. The origin of gunpowder is unknown. It was used by the Chinese before the beginning of the Christian Era, and it was known to the nations of Europe in the thirteenth century; but it did not come into general use in war until the sixteenth century.

The first essential in the manufacture of gunpowder is purity of materials. The saltpeter is purified by dissolving it in hot water and allowing it to crystallize. The sulphur is purified by distillation, and the charcoal is obtained by burning willow or alder in cast-iron retorts. Each of these substances is ground to powder; then all three are mixed in the proper proportions in revolving cylinders. The mixture is then moistened and ground between heavy stone rollers. The lime thus produced is sent to a hydraulic press, where it is subjected to different degrees of pressure, according to the grade of powder desired. A high pressure produces powder that burns quickly and has a high explosive power, while a low pressure gives a slow-burning powder. As the mass, called the *press cake*, leaves the press, it goes to the granulating machine, where toothed rollers break it into grains of various sizes, which are sorted by a series of screens. The powder is then polished by being placed for several hours in revolving wooden barrels. After this it is dried and is ready for use. The powder used in rifles is more highly explosive than that used for blasting and in cannon. **Blasting powder** contains 70 parts saltpeter,

18 parts sulphur and 12 parts charcoal. That used in cannon contains 75 parts saltpeter, 15 parts sulphur and 10 parts charcoal. Smokeless powder, dynamite and other explosives have largely replaced powder for many purposes. See **EXPLOSIVES**.

GUNPOWDER PLOT, a conspiracy formed in England in the reign of James I, by a group of Roman Catholics who were incensed at the government because of its severity toward them. They planned to put to death the king and members of Parliament, by wrecking the Houses of Parliament by an explosion of powder.

The plot originated with Robert Catesby, Guy Fawkes and others, and the time fixed for its execution was November 5, 1605, when Parliament was to be opened by the king in person. The plot was discovered by means of a letter sent by one of the conspirators to a relative of his, a Catholic peer in favor with the court, warning him not to be present at the approaching meeting of Parliament. Fawkes, with several others, was tried at Westminster and put to death.

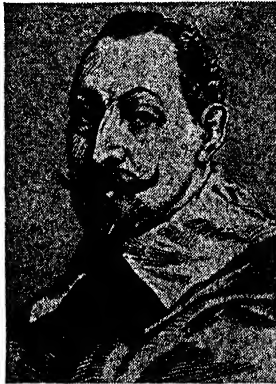
GURNARD, a family of fishes of which there are about forty known species. The head is angular and covered with bony plates; the body is long and tapering. The three lower rays of the breast fins are detached and are used as feelers. The fish make their home in very deep waters; when brought to the surface they make a peculiar noise which has given them the name of *grunters*. In the United States and Canada they are also known as *sea robins*. One species, found on both sides of the Atlantic, is called the *flying gurnard*, because of its enormous, winglike fins. Many of the gurnards are beautifully colored.

GUSTAVE V (1858-), son of Oscar II of Sweden, succeeded his father in 1907. He was educated at the University of Upsala, and before his accession had served in the army and spent considerable time in travel over Europe. His father, too, was fond of travel, and on several occasions, during the illness or absence of the king, the prince acted as vice-regent. He thus gained firsthand knowledge as to the duties of the royal office. As king, Gustave V showed himself in sympathy with the liberal movement in Sweden, but he aroused the opposition of the Socialists by advocating a strong military policy at the outbreak of the World War. During the war he kept Sweden strictly neu-

tral, though the country suffered greatly from the effects of submarines and blockades. Throughout his reign, he enjoyed the confidence of his people. In 1929 his daughter, the Princess Martha, became the wife of Prince Olaf of Norway. See SWEDEN.

GUSTAVUS I, commonly called **GUSTAVUS VASA** (1496-1560), king of Sweden. He was the son of a Swedish noble, served in the struggle for Swedish independence, was treacherously carried off with other Swedes by the king of Denmark and was kept a prisoner in Jutland for more than a year. At length, however, he escaped, reached, after many dangers, Dalecarlia, where he roused the peasants to resist Danish oppression, defeated the Danes, took Upsala and other towns and in 1523 was elected king. In 1529 he procured the abolition of the Roman Catholic religion in Sweden and established Protestantism. During his long reign Sweden made great progress in commerce and civilization.

GUSTAVUS II ADOLPHUS (1594-1632), king of Sweden, a grandson of Gustavus Vasa, came to the throne in 1611. He was trained to war, took his place in the state councils at the age of sixteen, and was in command of the army in his seventeenth year during the war with Denmark, by which Sweden recovered important possessions on the Baltic. He then turned his arms against the Russians and drove them from Ingria, Karelia and a part of Livonia, which were secured to him by the peace of Stolbova in 1617.



His first great war was that with Poland, which lasted nine years and was concluded favorably for Gustavus in 1629. His attention was then diverted from northern wars by the affairs of Germany. The oppression of the Protestants by Ferdinand II excited his sympathy, and the progress of Wallenstein alarmed him; perhaps, too, he was moved by ambition for foreign conquests. He embarked for Ger-

many in 1630, landed near the mouth of the Oder and in a short time had seized nearly all of Pomerania. After taking many fortified towns, defeating the imperial generals and conquering a great part of Germany, he was killed in the Battle of Lützen, in which, however, his army was victorious (see THIRTY YEARS' WAR). Though a severe disciplinarian, he was beloved by his soldiers, and the prestige of success derived from his victories lasted long after his death.

GUSTAVUS III (1746-1792), king of Sweden, succeeded to the throne in 1771. Finding the country weary of the misrule of the nobles, he gained the good will of the army, surrounded the States-General and forced it to accept a new constitution, which much restricted its privileges. In 1788 he took command of the army against Russia and Denmark, but accomplished nothing of importance. On the outbreak of the French Revolution he tried to form a coalition between Russia, Denmark, Sweden and Spain, but while he was making his preparations, a conspiracy of the nobles was formed against him and he was shot at a masked ball.

GUSTAVUS IV ADOLPHUS (1778-1837), king of Sweden, son of Gustavus III, whom he succeeded in 1792. On assuming power Gustavus showed that he had inherited his father's hatred of the principles of the French Revolution, which he carried to the extent of fanaticism. After the Peace of Tilsit he exposed himself to a war with Russia while he was at war with France, by refusing to join the Continental blockade and by opening his ports to England; and in 1808 he quarreled with England, his only ally. Finland was lost to Sweden, and in 1809 a revolution took place, in which Gustavus was dethroned, and his uncle, the duke of Sudermania, was proclaimed king as Charles XIII.

GUTENBERG, *goo'ten berK* **JOHANNES**, (1400-1468), the inventor of the process of printing with movable type. His original name was **JOHANN HENNE GENSFLEISCH**; Gutenberg was probably his mother's family name. Of the details of his life, apart from the invention which has immortalized him, but little is known. He was born in Mainz, of noble family, and was a prominent man in his native city until, in about 1420, he was, with others, obliged to leave, on account of political dissensions. He took refuge in Strassburg, spent twenty-four years there,

and then returned to Mainz, where he formed a partnership with Johann Faust, or Fust, a money lender, who advanced money to set up a printing press. Faust dissolved the partnership and, since Gutenberg could not repay the sum advanced, took possession of most of the printing outfit.

Faust and his son-in-law, Peter Schöffer, continued the business and claimed the credit of the invention, but the latter's son, Johann Schöffer, states in a preface of 1505 that the "admirable art of printing was invented in Mainz in 1450 by the ingenious Johann Gutenberg and was subsequently improved and handed down to posterity by the capital and labor of Johann Faust and Peter Schöffer."

The invention of the modern art of type printing has by some been ascribed to a Dutchman named Koster, but a thorough investigation has firmly established Gutenberg's claims. Gutenberg is known to have printed several religious books, but as his name did not appear on any of his printed works, it has been difficult to identify them, impossible, indeed, in many instances.

As has been true of many pioneers in invention and discovery, Gutenberg never was successful financially; in his last years he was the recipient of a modest pension from scholars who were profoundly grateful to him. Statues have been erected in his honor in many cities, among which is one by Thorwaldsen, erected in 1837 in Mainz. See PRINTING.

GUTHRIE, OKLA., the county seat of Logan County, and formerly capital of the state, thirty miles north of Oklahoma City, on Cottonwood Creek and on the Santa Fé and the Fort Smith & Western railroads. The city was laid out and settled in 1889, on the day that the territory was opened for settlement, and was the capital from 1890 to 1911. It developed rapidly and now has an extensive trade. The factories include cottonseed oil, lumber and flour mills, foundries and machine shops, and cotton-spinning factories, and there is a creamery. The principal buildings are a Federal building, a city hall, a Carnegie Library and a Scottish Rite Temple, the latter said to be the largest in the United States used exclusively for Masonry. There are two parks. The city has the Saint Joseph's Academy, for girls. The city manager form of government is in effect. Population, 1910, 11,654; 1920, 11,757; in

1930, 9,582. Its loss of population is due to its nearness to Oklahoma City.

GUTTA-PERCHA, *gut'ta pur'cha*, a substance resembling india rubber in many of its properties, but stronger, more soluble and less elastic. It is the milky juice of certain trees found in Malacca, Borneo and other islands of the Indian Archipelago. When pure, gutta-percha is of a brownish-red color. Below the temperature of 50°, it is as hard



GUTTA-PERCHA

as wood and excessively tough. By an increase of heat it becomes more flexible, until, at a temperature of 115° F., it becomes pasty, and between this and 140° or 150° it may be molded into all varieties of forms with the greatest ease, retaining precisely the same form as it cools and hardens. It is insoluble in water, is soluble with difficulty in ether and other rubber solvents, but mixes very readily with oil of turpentine and naphtha. It is not attacked by solutions of alkalies nor by hydrofluoric acid, but it is acted on by sulphuric, nitric and hydrochloric acids. Gutta-percha has been applied to a variety of purposes, as a substitute for leather, especially in the soles of shoes and other articles; as an insulating coating for the copper wires of submarine telegraph cables; as an ingredient in mastics and cements; for the manufacture of flexible hose tubes and bottles, and for many other purposes.



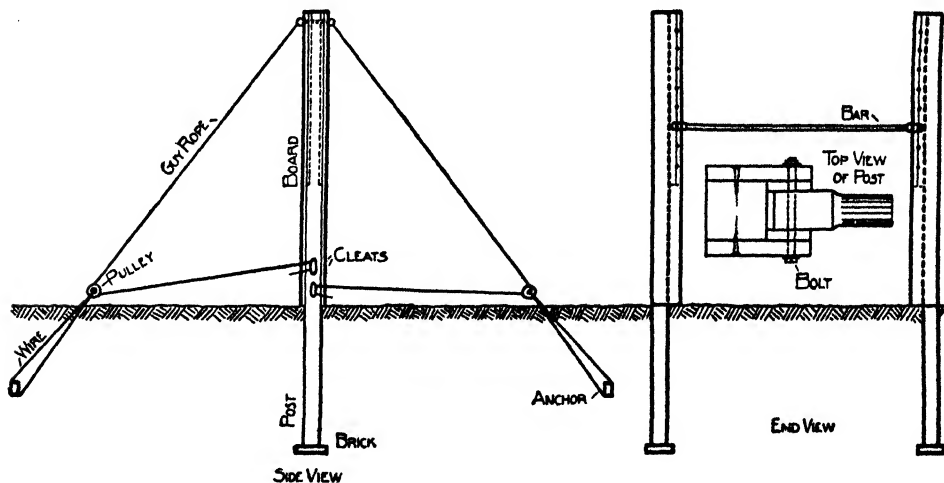
GYMNASIUM, *jim na'ze* um, a building or room equipped for exercise and athletic uses. Gymnasiums are attached to almost all schools and colleges, and in many cities various clubs and societies support them. Many of the larger high schools have fine rooms, abundantly equipped with varied apparatus, where the pupils take regular and systematic exercise under trained instructors.

In the following paragraphs instructions are given for constructing a simple gymnasium, quite adequate for amateurs. Two or three boys with a few simple tools and the necessary lumber, bolts and rope can easily prepare it. If possible, the lumber should be purchased squared and cut to length.

Horizontal Bar. The most important piece of apparatus in the gymnasium is the horizontal bar. As many boys may not have place indoors for this apparatus, set it up outdoors.

by 3 in. by 3 ft. 9 in. long; and 1 piece, 2½ in. square by 5 ft. 7 in. long. This last piece should be well-seasoned, straight grained hickory, to make a bar. For the other pieces it is best to use cedar, as that wood rots very slowly, but ordinary yellow pine will do very well. If possible, the four 7 in. boards should be of hard wood. Besides the timber you need 2 bolts, ½ in. in diameter, and 7 in. long; 16 screws, 3 in. long; 4 heavy screw eyes with two ½ in. shanks; 50 ft. of heavy galvanized wire; 80 ft. of ½ in. manila rope and 4 pulley blocks. Four cleats are also needed; these can be made at home.

Draw a line on the four 7 in. boards along the side of each from end to end, 1½ in. from one edge. Beginning at one end of each board make 8 pencil dots on this line 5 in. apart. Bore holes through the board at these points with a ⅝ in. bit. Fasten two of these boards on each post with the 3 in. screws, as shown in the top view, forming a channel of the edges in which the holes were bored. Two of the filler pieces should now be fastened in each channel so as to make the space fit the squared end of the bar. The ends of the boards with the holes should be level with the top of the post, so that each pair of holes in the 7 in. boards coincide.



HORIZONTAL BAR

Once we have accomplished that much, we shall find it easy enough to bring it indoors if necessary, or set up a new one. The material we need is as follows: two pieces of wood, 4 in. square by 9½ ft. long; 4 pieces, 1 in. by 7 in. by 6½ ft. long; 4 pieces, ¾ in.

Dig two holes 6 ft. apart, each 3 ft. deep, and remove all loose dirt. Set the posts in these holes on bricks or small stones. A mixture of one part cement, two parts sand and three parts small stones will make a better foundation. Be careful that not too much water

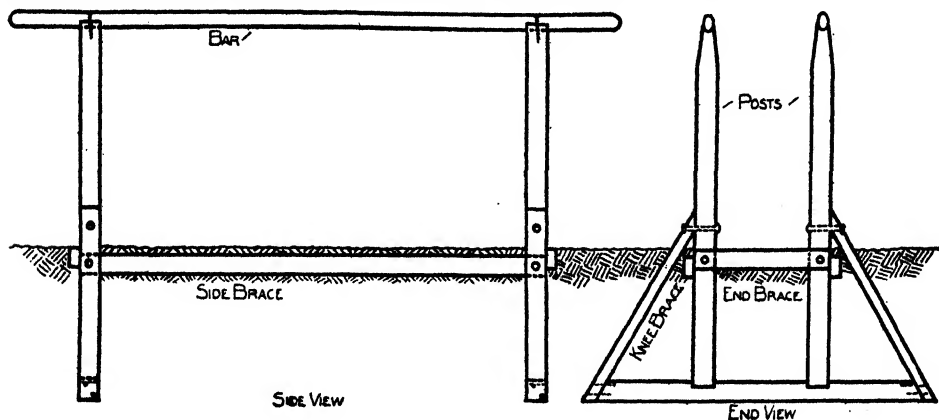
is used in mixing. The channels formed by the boards must be set facing each other with the inner surface of the posts parallel, 5 ft. 8 in. apart. Fill in the holes and tamp the ground well. Each post must be well braced to keep it rigid while a person is swinging on the bar. Place four anchors in the ground at the corners of an imaginary rectangle enclosing the posts, so that the posts are 8 ft. from the short sides and $1\frac{1}{2}$ ft. from the long sides. These anchors may be made of pieces of wood 2 ft. square, around whose center four strands of heavy galvanized wire are twisted, then buried to a depth of 2 ft. The wires should be carried above ground at an angle of about 45 degrees. The heavy screw eyes are turned into the posts at the top and lengths of rope tied to each. These ropes or guys pass through pulley blocks, which are fastened to the projecting ends of the anchor wires, and return to the posts where they are tied to cleats. Do not tighten the guy ropes without the bar in place, as to do so will strain the posts in the ground. For the same reason do not change the elevation of the bar before slacking up on the ropes.

For the bar you have secured a long hickory piece, which should be planed, scraped and sandpapered until it is perfectly smooth and round, except for 3 in. at one end. Through both square ends bore a hole to admit the $\frac{1}{2}$ in. bolts which will hold the bar

use heavy screw eyes, which need not be set as far apart as the anchors were outdoors. To hold the posts in position you need L-shaped iron braces such as can be bought at any hardware store.

Parallel Bars. Exercises on parallel bars are among the best means for the development of the back and shoulders. One can make a set of these bars with very little trouble, if one has or buys the following material: 4 posts, preferably cedar; 4 in. square and 6 ft. long; 2 base pieces, 4 in. square and 5 ft. 6 in. long; 2 cross braces 2 in. by 4 in. by 2 ft. 2 in. long; 2 side braces 2 x 4 by 7 ft. 8 in. long; 4 knee braces 2 x 4 by 3 ft. 8 in. long; 2 bars; 2 bars of straight-grained hickory 2 x 3 by 10 ft. long; 4 wood screws 6 in. long; 4 bolts, 8 in. long; 8 bolts, 7 in. long; and one dozen large spikes.

First bevel the ends of the base pieces at an angle of 60 degrees. Chisel out two notches, 4 in. wide and 1 in. deep, beginning at a point 9 in. from either side of the center; these are to receive the lower ends of the posts. Bevel the two sides of one end of each post down to a width of the finished bar—a little less than 2 in. Cut notches in these ends to receive the oval bars. Bevel the ends of the knee braces, and fasten the lower ends to the beveled ends of the bases with spikes. The upper ends of the knee braces should be fastened to the uprights with 8 in. bolts put



in place. The bar should be oiled and reversed occasionally to keep it from curving and drying.

To set up such a horizontal bar indoors is just as easy. The posts should be 3 ft. shorter. Instead of the anchors we should

through holes bored for the purpose. It will be best to countersink the heads of the bolts—that is, they should be below the surface.

With 7 in. bolts fasten the end braces with their top edges 2 ft. 6 in. from the bottom of the base. Drive nails slantingly into the ends

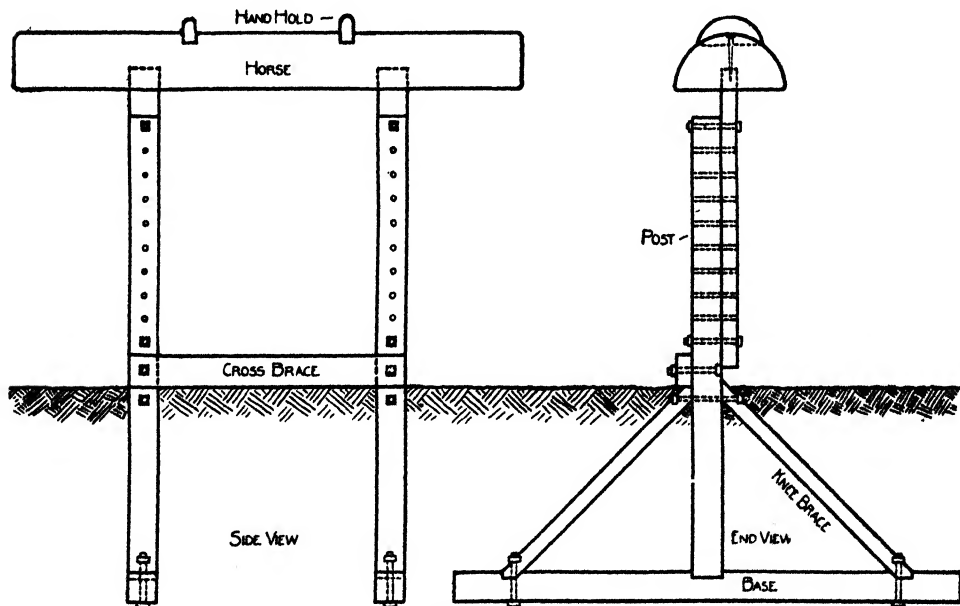
of the posts, merely to hold them to the base while the apparatus is being handled. Now we must dig two parallel trenches, $2\frac{1}{2}$ ft. deep, about 5 ft. long, and 7 ft. apart, for the end braces and two more trenches just deep enough to hold the side braces. These side braces should be bolted to the posts just below the cross braces, so the bolts in both will not meet. The bars should be dressed down so that a cross section is oval as shown in the end view. Use the 6 in. screws to hold these to the notched uprights. Countersink the holes so that they can be filled with putty after the screws are in place. It would be wise to oil the bars with linseed oil to protect them from the weather.

It is not necessary to use dressed lumber from the mill for this apparatus, except for the bars. If mill-cut lumber is used, it should be undressed, and if round is used, it should be left with the bark on it, to protect it from the weather. If the timbers, except the bars, are painted, the wood will last for years, but even unpainted cedar is very durable.

The Horse. The horse may be used as an obstruction over which to leap, slide, or

the larger the better—and 5 ft. to 6 ft. long. The round part must be planed, scraped and sandpapered until it is perfectly smooth. Make two parallel saw cuts 2 in. apart, straight down in the round surface of the log until each cut is 9 in. long. 18 in. away make two more cuts of the same size. Chisel out the wood between each pair of cuts and insert the two hand holds, which should be made of two pieces of $2 \times 4 \times 9$, cut rounding on one edge. Nail these hand-holds in place.

The body of the horse should be fastened to the posts so that its height may be adjusted. Two posts are needed, 4 in. square by 5 ft. long; 2 adjusting pieces $2 \times 4 \times 3$ ft. 3 in. long; 1 cross brace $2 \times 4 \times 3$ ft.; 2 bases, 4 in. square by 3 ft.; 4 knee braces, $2 \times 4 \times 3$ ft.; 2 one-half inch bolts, 9 in. long, to fasten the knee braces at the top; ten $\frac{1}{2}$ in. bolts, 7 in. long, 4 to fasten the knee braces at the bottom, 2 to fasten the cross brace, and 4 to fasten the adjusting pieces to the posts. Cut mortises, that is, cut out notches, on the bases so that the bottom ends of the posts are exactly in the middle; then cut a slanting notch 6 in. from each end for the knee braces.



THE HORSE

swing, and also as an artificial back for a peculiar style of leap frog, and many other games which boys are constantly devising.

First, one must secure one-half of a tree trunk from a tree 9 in. to 15 in. in diameter—

Bevel the ends of the knee braces, put them in place and fasten with bolts, the upper ends with a 9 in. bolt, the lower with a 7 in. bolt. Beginning $1\frac{1}{2}$ in. from the top, at intervals of 3 in., bore $\frac{1}{4}$ in. holes through each

post parallel to the base. Nine or ten holes will be enough. The adjusting pieces should be bored in the same manner, then mortised into the flat side of the log 15 in. from each end and secured with screws put through the top and into the end of the adjusting pieces.

When the posts and knee braces have been securely fastened to the bases, these should be buried 2 ft. 4 in. in the ground, parallel to each other at the same distance apart as the adjusting pieces mortised in the horse top. Then bolt the cross brace with its lower edge resting on the ground.

After the ground has been tamped hard the horse is ready for use. The height of the horse is adjusted by changing the bolts in the different holes connecting the two adjusting pieces with the two posts. All sorts of jumps and leaps will be devised to keep the horse in constant use.

With some slight changes any of these pieces might be used indoors. The uprights would be shorter by so much as is now buried in the ground. The braces would have to be bolted at different angles. Probably the bases would have to be fastened to the floor to keep the uprights from upsetting. The apparatus bought for regular gymnasiums is made with heavy metal bases, but our apparatus will do fully as well if it is fastened to the floor. If we can weight it in some way, so much the better. Whatever we do we shall be sure to enjoy making the apparatus, and once it is made, how much prouder we shall be than if we had bought it readymade!

Dumb-Bells. No gymnasium, whether indoor or outdoor, can be complete without a pair of dumb-bells. Any boy can make as many as he wants. First get two large tin cans—such as a quart fruit can—and cut out the ends. Shape four round pieces of wood just large enough to fit tightly in the ends of the cans. Then cut a hole in the center of each just large enough for the bar, which may be any piece of hard wood from 12 in. to 18 in. long. To one part of cement and two parts of sand add water till the sand and cement have thoroughly mixed. Pack this mixture tightly into the cans and insert the wooden disks in the ends. Push the hardwood bar through the holes in the inside disk so that it runs past the center of each can of cement and leaves a proper length of rod between. The two inner disks should first be strung on the bar and a few nails driven into the cement to give it a good grip.

After several days the cement will be dry. Then remove the tin and wooden disks. The cement may now be filed into any shape desired. If a dumb-bell of this kind is not heavy enough it may be weighted with stones or metal mixed in the cement and sand.

GYMNASTICS, *jim nas'tiks*, the technical term used to designate any system of exercises specially designed to promote the development of physical and, especially, muscular powers. An excellent gymnastic training is given by baseball, football, rowing and similar amusements, but the special value of formal gymnastic exercises is that they are capable of being scientifically arranged so as to secure not only a general development of muscular power, but also to give suitable training to the separate muscles. Furthermore, they are capable of being applied to each person so as to meet, allow for and, as far as possible, overcome defects in his physical organization. For these purposes an elementary course of gymnastics is of great value to all, especially to the person of sedentary habits.

Two general rules may be laid down, which form an efficient guide in self-imposed exercises. The first is the universal rule in mechanics, that the strength of any machine is the strength of its weakest part; the second is the fundamental law of muscular exercise, that it is exercise *within* the extreme power of a muscle which develops and improves, while *straining* a muscle weakens and injures it, and excessive exercise develops particular muscles at the expense of the general health. It is quite possible, indeed, to carry general physical exercises too far, and to develop muscular power at the expense of vital strength. Till the age of twelve the ordinary games and pastimes of childhood are generally quite sufficient exercise; after that some very light system of gymnastics may be adopted to aid the development of the system. After the age of thirty-five, unusual muscular efforts are apt to leave persistent strains, and moderate exercise becomes the safest means of developing and giving tone to the muscular system. See GYMNASIUM.

GYMNOSPERMS, *jim'no spermz*, one of the two great divisions of seed-bearing plants. The gymnosperms have naked, or exposed seeds; the name is derived from the Greek words for *naked* and *seed*. Plants with seeds protected by a seed-case are called angio-

perms (which see). There are more than 400 species of the gymnosperms, and all are trees or shrubs. To this group belong the trees which yield rosin, tar and turpentine, and the hardy firs and pines which bear cones. Their flowers are small and inconspicuous, and each plant bears only one kind, pistillate or staminate.

GYPSIES, *jip'siz*, a group of strange people made up of numerous wandering tribes scattered throughout Europe, Asia, Northern Africa and America. It is not known with certainty where they first appeared, but a Hindu origin is probable. From Asia, where to-day there are countless thousands, they wandered, in the sixteenth century, to Europe, and now number there about 700,000. These people, who call themselves Romani, offer a baffling problem to the scientist, preserving as they do their racial existence through the centuries and in all lands.

Unlike the Jews, who have likewise retained their physical and racial characteristics throughout their history, the gypsies have no common bond of religion or tradition, no unifying influence of intercommunication among themselves which would tend to keep them distinct. Only instinct such as is found in the lower animals seems to lead them to follow in the path of their ancestors, speaking their own language, which is handed down from mouth to mouth, roaming from place to place, and marrying always within their own ranks. Untouched by the civilization about them or by the changes which modern inventions have made, they continue from generation to generation, the primitive, half-barbarous life of their predecessors.

Gypsies have the strong bodies and dark skin usually possessed by peoples who live in the open. Their hair and eyes are jet-black, their teeth very white. In youth they are not unattractive, but ugliness overtakes them early. Their nomadic habits interferes with settled occupations. The men are horse traders, and the women make baskets and tell "fortunes." They seem to have no definite religion. The marriage ceremony is of the simplest, and is not binding on the part of the husband if he tires of his wife. The children grow up in idleness and acquire habits of stealing and cheating. Gypsies are popularly supposed to be addicted to the vice of child-stealing.

GYPSUM, *jip'sum*, a hydrous calcium sulphate. It is found in a compact state as

alabaster (see **ALABASTER**), or crystallized as *selenite*, or in the form of a soft, chalky, stone, which in a very moderate heat changes to a very fine white powder, extensively used under the name of plaster of Paris. The last is the most common and is found in great masses near Paris, France; large beds are found also in Nova Scotia, Virginia, Michigan, New York, Iowa and Ohio. It may be geologically of any age, but it occurs abundantly in the more recent sedimentary formations and is even now forming, as a deposit from water holding it in solution; from the decomposition of iron pyrites, when the sulphuric acid combines with lime, or from the action of sulphurous vapors in volcanic regions on rocks containing lime. When gypsum occurs without water it is called *anhydrite*, but in its most ordinary state it contains water, together with the lime and sulphuric acid. Gypsum, pulverized by grinding or burning, has been used with good effect as a fertilizer, especially as a top dressing for meadows. See **FERTILIZERS**.

GYPSY MOTH, an insect which has long been exceedingly destructive to fruit and shade trees in Central Europe, and which in 1869 was introduced into America by a man who was experimenting to find a silkworm which would be free from disease. Some of his specimens accidentally escaped, and although he called the attention of the public to the fact, yet the matter was neglected until about twenty years later, when their ravages became so severe that the legislature of Massachusetts was compelled to take action to exterminate them.

The male moth is described as brownish-yellow, varying to greenish-brown in color, with a slender body and an expanse of wings ranging from one to one and one-half inches. The wings are darker than the body and have prominent black markings. The flight is characterized by a peculiar zigzag motion, which assists in identifying the insect. The body of the female is light buff and covered with hairs which are used by the moth to protect the eggs when they are deposited. The wings have an expanse of nearly two inches, and are nearly white, with small black markings. However, because of the large size of the body, the female is unable to fly.

The eggs are deposited in July and August in clusters about three-fourths of an inch wide and an inch and a half long, forming a yellowish hair-covered mass. The clusters

vary in size and contain from 75 to 1,000 eggs.

The eggs hatch about the first of May and the larvae or caterpillars feed upon the foliage of fruit and shade trees until mid-summer, when they enter the pupal state. The caterpillars are hairy, and when full grown have a sooty-colored body, containing on the back a double row of red spots. The head is yellow. Before they are half grown the caterpillars frequently suspend themselves from branches of trees and drop upon animals and carriages, by which they are taken to localities not previously infested. The sudden appearance of these caterpillars in such localities may often thus be accounted for.

The caterpillars prefer the leaves of the oak, the willow, the elm and the apple tree, but they will feed upon the foliage of all fruit and shade trees, and when other sources of food fail, will attack vines, shrubs and even garden and field crop in their vicinity. They even attack the white pine, and in some localities have caused the destruction of many of these trees.

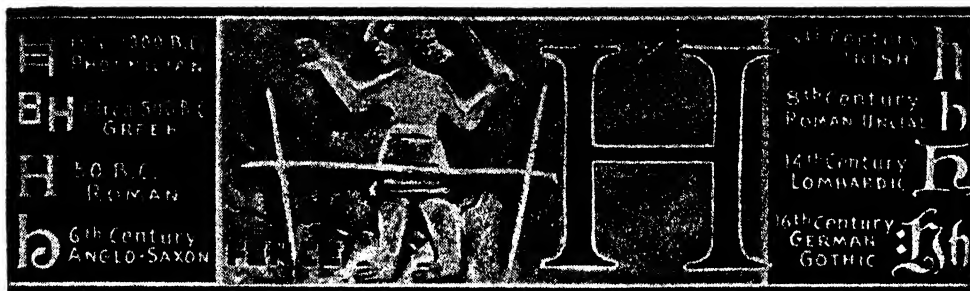
The best method found for destroying the growing caterpillars consists in spraying the trees with a solution of arsenate of lead, using ten pounds of arsenate to one hundred gallons of water. The spraying is most effective when done in May and June. The egg clusters can be killed by soaking them thoroughly with a creosote mixture. This work can be done effectively between August and May. Banding the trees with strips of burlap or other coarse cloth, in such a manner that the bands fold over and form a shelter for the caterpillars, is a good means of destroying large numbers. The caterpillars crawl under the folds during the night and the bands should be examined daily. At the end of the season the bands should be burned. Infested areas should be cleared of all brush, and hollow trees and untilled lands where egg clusters are supposed to exist should be burned over.

GYRO-COMPASS, a recently developed mariner's compass, which by the application of the principles of the gyroscope, indicates geographic north, and at the same time is

free from the magnetic disturbances inevitable on steel ships. The essential parts of this instrument are a gyro wheel driven at moderately high speed by electricity, its parts supported by gimbals in a suitable case or binnacle, and the compass built up around the gyro wheel. By means of an ingenious device the force of gravity is applied to the revolving wheel in such a way as to overcome the precessional effect and to cause it to seek and maintain a motion in the plane of the meridian, no matter in what direction the ship is in motion. The gyro-compass is used not only in naval vessels but in practically all large merchant vessels on account of the added safety and surety of navigation it affords.

GYROSCOPE, *jī'ro skōp*, an instrument which exhibits the various phenomena of rotation. It consists of a heavy solid circular disk mounted upon an axis, both ends of which are supported in a circle at right angles with the disk. In the complete gyroscope this circle is upheld by two supports forty-five degrees from the axis supports. The joinings are equipped with bearings which allow free rotation of the disk at any angle. When set to revolving rapidly the disk is with difficulty moved out of its plane of rotation; the axis maintains its direction even though the position of the standard is constantly changed. If moved in a circle the axis remains at the same angle just as the axis of the earth maintains its angle to the plane of its orbit.

The action of the gyroscope is based on the principle that if a mass is set rotating about a central axis it will continue to rotate in the same plane, the direction of the axis remaining unchanged, unless external force is applied. When first devised the gyroscope was regarded as a mere curiosity. It now has a number of practical uses. It is employed as a stabilizer on ships, aeroplanes and monorail cars. The heavier the disk and the higher its rate of speed, the greater the force required to disturb its poise. On ships the weight of the gyroscope is usually $\frac{1}{10}$ of the ship's displacement.



H, the eighth letter of the English alphabet, is derived in form from the Phoenician character, which was but an *H* closed at top and bottom with a line. In sound, the Phoenician letter resembled the German *ch*, but in early Greek it corresponded nearly to our *h*. *H* in English is called the *aspirate*, as it is a mere breathing, with the vocal organs in the position demanded by the following vowel. It is very commonly joined to other consonants to represent sounds for which there are no special letters in the alphabet, as in *ch*, *sh*, *th*, or in other consonantal combinations, as in *enough*, *plough* or *philosophy*.

HAAKON, *haw'kon*, the name borne by six Norwegian kings in the Middle Ages. It was adopted by Prince Charles of Denmark, who came to the throne of Norway in 1905 as Haakon VII.

HAAKON VII (1872-), is the second son of Frederick VIII of Denmark (died 1912) and brother of the present king, Christian X. He was asked to become ruler of the Norwegian people by invitation of the Storting, or Parliament of Norway, in 1905, after the separation of Norway and Sweden, and was crowned in the cathedral at Trondhjem. His reign has been marked by a progressive development of economic and political reforms, including the extension of full suffrage to women. Haakon married Princess Maud of England, youngest daughter of the late Edward VII. The heir-apparent, Prince Olaf, married Princess Martha of Sweden in 1929, strengthening political ties and bonds of friendship between the two countries. For information on the separation of Norway from Sweden, see the article, **NORWAY**.

HAARLEM, *hahr'lem*, **THE NETHERLANDS**, capital of the province of North Holland, located ten miles west of Amsterdam. It is well built and is one of the most attractive

cities in Holland. Among the chief structures are the cathedral of Saint Baro and the town hall. The industrial importance of Haarlem, as well as its population, is less than formerly. It still has various manufacturing establishments and a celebrated type foundry, the oldest and most famous printing office in Holland; and its flower trade, especially in hyacinths and other bulbs, is important. It is the birthplace of Laurence Coster, believed by the Dutch to be the inventor of movable types (see **PRINTING**), and of a number of painters, Ostade, the Wouvermans, Ruisdael and Van Loo. Population, 1932, 122,386.

HABAKKUK, *ha bak'uk*, or *hab'a kuk*, a book of the Old Testament, written about 600 B. C. by Habakkuk, the eighth of the minor prophets of Israel. The book is the fifth from the last in the Old Testament, and has but three chapters. In the first chapter the author expresses his fear that the innocent will suffer for the trespasses of the wicked. In the second Habakkuk is told that he must have faith, and the final chapter is an eloquent expression of the prophet's trust in the power and goodness of Jehovah.

HABEAS CORPUS, *ha'be as kawr'pus*, a term meaning (*that*) *you may have the body*. It is a legal writ, issued by a judge, compelling officers of the law who hold a man under arrest to appear before the court with the accused and show cause for detaining him. The object of the writ is to protect innocent people from unjust seizure and detention. If the inquiry before the court does not develop sufficient evidence to hold the accused the court may order his release on bonds; if an unbailable offense is charged and the evidence presented appears to sustain it, the court may dismiss the writ and leave the accused to the due processes of law.

The executive authority of a state or na-

tion may suspend the operation of the writ of habeas corpus in times of public danger. In cases of grave rioting it is sometimes prudent to arrest trouble-makers and hold them temporarily. In time of war it may be necessary to arrest persons suspected of actions dangerous to the government and to hold them without trial. In such instances were the right to demand the operation of the writ not suspended, evil consequences might follow, for the government might be required, in opposing writs, to disclose information valuable to an enemy.

The Constitution of the United States declares (ART. I, SEC. 8) :

The privilege of the writ of habeas corpus shall not be suspended, unless when in cases of rebellion or invasion the public safety may require it.

HABIT. The child learning to walk is conscious of every step he takes. Occasionally he falls down, and all his movements are unsteady and faltering. After a time the halting steps become firm, the gait becomes steady, and the young walker goes about with perfect assurance. The reason is that walking for him has become a habit. Habit may be defined as a fixed tendency to do something in a certain way. When the habit is firmly established the act is accomplished without conscious effort. A multitude of habitual acts are performed every day in the routine of life. The movements of dressing, combing the hair, sitting down to breakfast, walking to the train, dusting off the desk, and so on, are all acts of habit.

Why the body functions in this way is an interesting problem. The theory is that when a current of nerve force once traverses a nerve tract, it produces such a condition in that tract as to make it easier for the current to traverse it again, and that the more times the current traverses the tract, the easier its passage becomes, until the nerves become so habituated to the passage that the only volition necessary to the act is that which starts it.

As bodily habits are formed by repeated muscular movements, so are mental habits formed by repetition of the same mental act. This is what is meant by saying that any mental power, as memory, imagination or will, is developed by use. The person whose memory is well trained during childhood has a good memory through life; likewise, one whose will has received proper culture be-

fore he is twenty years of age, has developed a power of decision and action that will usually assure him success in his chosen work.

During childhood and youth the nervous system is in a plastic condition and can easily be trained in any direction; hence it is during this period that most of the habits of life are formed. It is therefore all-important that early habits be such as will contribute to the individual's highest good—physical, intellectual and moral. In order that this result may be secured, the child should be trained to do things in the right way, to speak correctly and to choose the right. After twenty, important habits are formed less frequently, and after thirty, new habits are acquired with great difficulty. In order that a habit may be formed, success should be secured at the outset. Failure leads to discouragement and often to the abandoning of the attempt. When the choice is made and the habit is once launched, every opportunity to practice it should be embraced until it becomes firmly established. All acts or thoughts which tend to interfere with the formation of the habit should be set aside.

Habit saves time and strength. Were each successive act as difficult as the first, the most common and necessary movements would consume all one's vitality and one could never make progress. By making our common acts habitual, the mind is left free to exercise its powers on higher things. Were it not for this, memory, reason and will would never be properly developed and that progress of thought which has produced our present civilization would have been impossible. Habit also gives us skill in execution. It is only as we become unconscious of the movement and fix our attention upon the result that we execute our work skilfully.

Habit is the great conservator of society. It keeps the various classes of people at their chosen vocations. The miner cannot easily become a mechanic, nor the merchant a physician, and whatever longing a man may have for another calling, after he has become thoroughly established in a given occupation he seldom changes. Habit is the result of will power and determines character (see WILL). "A well-trained nervous system is the greatest friend that the mind can have. An ill-trained nervous system is a relentless enemy to the highest mental powers."

For further suggestions as to the importance of habit in child training, see the articles *Child Training* and *Kindergarten*.

HACK'BERRY, also called *nettle tree*, *sugar berry* and *hoop ash*, the name of a number of trees of rapid growth which belong to the same family as the nettles. The best known species is a large tree sometimes 120 feet high, which grows in the Western United States and Western Canada. It has a rough bark and nearly horizontal branches, and it may be used in much the same way as the elm. There are two species, of which the smaller, more generally known as the sugar berry, grows in the southwestern part of the United States.

HACK'ETT, JAMES KETELTAS (1869-1926), an American actor, born at Wolf Island, Ontario. He was the son of James H. Hackett, a well-known American actor, and graduated at the College of the City of New York. He made his début in 1892 at the New York Lyceum, at the age of twenty-three, being at the time the youngest leading man in the history of the New York stage. His most notable successes have been in *The Prisoner of Zenda* and its sequel, *Rupert of Hentzau*, *The Pride of Jennico*, *Monsieur Beaucaire* and *Don Caesar's Return*. He also appeared in *The Crisis*, a dramatization of Winston Churchill's novel. In 1897 he married the actress Mary Mannering and subsequently appeared with her in various successful plays. She divorced him, and in 1911 he married again in London.

HAD'DOCK, an important food fish, of the cod family, though less valuable than the cod. It is smaller than the cod, which it much resembles, and it has a dark line along its side and a dark spot just behind the head. It commonly weighs from two to six pounds, though sometimes as much as ten pounds. It breeds in immense numbers in the northern seas in February and March. It is plentiful on the coasts of America, from New York to the Arctic regions. When dry-salted it is placed on the market as *finnan haddie*.

HADES, *ha'deez*, originally, the Greek name of the ruler of the lower world, afterwards known as Pluto. The name Hades was in later times applied to the region itself, which was supposed to be the abode of all departed souls, whether good or bad. The term is also used in the Greek scriptures to designate the home of the dead.

HADJ, or **HAJJ**, *haj*, the Mohammedan pilgrimage to the Kaaba at Mecca, which every Mohammedan is bound to perform once in his life, if his health and means

permit, after which he is entitled to prefix *Hadji* to his name. See KAABA.

HADLEY, ARTHUR TWINING (1856-1930), an American educator, born at New Haven, son of James Hadley. He was educated at Yale and at the University of Berlin. After completing his studies abroad, he became tutor at Yale and later professor of political science. In 1899 he was elected president, resigning in 1920. Doctor Hadley attained more than a national reputation by his writings on financial and economic subjects, on both of which he is considered eminent authority. Because of his fame in this direction and also because of his ability as an executive he was elected a director of the New York, New Haven & Hartford Railroad in 1914, after financial scandals had nearly wrecked the company. He has been president of the American Economic Association and is the author of *Railroad Transportation, its History and Laws; Report on the Labor Question; Economics; An Account of the Relations between Private Property and Public Welfare, The Education of the American Citizen and Freedom and Responsibility*, besides a large number of articles which have appeared in the leading periodicals.

HA'DRIAN, (76-138) fourteenth Roman emperor. His father, cousin to the emperor Trajan, died when he was ten years old and left him under the charge of his illustrious kinsman. He married Sabina, Trajan's grand niece, accompanied the emperor on his expeditions, filled the highest offices and, on the death of Trajan, assumed the government as his adopted son (117). He made peace with the Parthians, renouncing all conquests east of the Euphrates, and bought off a war with the Roxolani by the payment of a sum of money. From the year 121 he spent most of his time visiting the various provinces of the Empire. He traveled into Asia and Africa and lived in Athens for three years. In 131 he promulgated a fixed code of laws, which formed an important epoch in the development of Roman law. In 132 the Jews revolted, and for four years they carried on a bloody war, the only notable one of his reign.

HADRIAN'S TOMB, an enormous round tower, erected by Hadrian in Rome about A. D. 130 and completed by his successor. In the Middle Ages it was used as a fortress and prison, and material changes have been made from time to time. Tradition says that

Beatrice Cenci, Cagliostro and Buenvenuto Cellini were confined in it. The structure is now called the Castello Saint Angelo.

HAECKEL, *hek'l*, ERNST (1834-1919), a German naturalist, born at Potsdam. He studied medicine and science at Berlin, Würzburg and Vienna. After traveling in Norway and Italy, he became professor of zoölogy at Jena in 1865. He became the most prominent exponent of the Darwinian theories in Germany. Among his works are *The History of Creation*, *Anthropology*, *History of the Evolution of Man*, *Collected Popular Discourses on the Development Theory* and *Origin and Development of Animal Tissues*.

HAEMOGLOBIN, *hem o glo'bin*, or *he mo-glo'bin*, the substance in the blood which gives it its red color. It is found only in the red corpuscles, and has the power of absorbing oxygen from the air in the lungs and giving it up to the body tissues. Haemoglobin contains iron. See BLOOD.

HA'GAR, an Egyptian servant of Abraham's wife Sarah. According to the narrative in Genesis, God had promised Abraham children, but when Sarah remained childless to an advanced old age, she ceased to hope for a child of her own; and, to bring about fulfilment of the promise, gave Hagar to Abraham as his secondary wife. To Hagar was born a son, Ishmael. Shortly afterwards Sarah also gave birth to a son, Isaac. Rivalry between the two families resulted in the expulsion of Hagar and Ishmael, who wandered in the wilderness of Beersheba, where an angel of the Lord saved them from perishing.

HA'GERSTOWN, Md., settled about 1740, is the county seat of Washington County, nearly ninety miles northwest of Baltimore, on the Baltimore & Ohio, the Norfolk & Western, the Western Maryland, and the Pennsylvania railroads. There is an airport. The city is an important commercial center for the western part of the state. Among more than 130 industries are machine shops, railroad shops, knitting mills and the manufacture of furniture, ice, pipe organs, agricultural implements and cement, and shoes. Population, 1920, 28,029; in 1930, 30,861, a gain of about ten per cent.

HAGFISH, an eel-like fish, allied to the lampreys, that lives as a parasite upon other fishes. The mouth is large and adapted to sucking; there are no jaws; the eyes are rudimentary. A single fang upon the palate

enables the hagfish to rend its prey, which are small cod, halibut, flounder and such. The skeleton is composed entirely of cartilage. The body is covered with a leathery skin that secretes slime. An American species is common in rivers of New York and New England.

HAGGAI, *hag'ga eye*, the tenth, in order, of the minor prophets, and the first of those who prophesied after the captivity. The book of *Haggai* consists of four distinct prophetic addresses, two in the first and two in the second chapter, intended to arouse the disheartened Jews to the rebuilding of the Temple. They were delivered in 520 B. C. and are written in a concise style. The closing predictions foreshadows the establishment of Christ's kingdom upon the overthrow of the thrones of the nations.

HAG'GARD, HENRY RIDER (1856-1925), an English novelist, born at Norfolk and educated at Ipswich Grammar School. He was admitted to the bar, but devoted himself almost exclusively to literary pursuits. He traveled extensively and developed a morbid taste for the wierd and strange. His most popular novels among nearly fifty that he has written are *King Solomon's Mines* and *She*. Others are *Jess*, *Allan Quatermain*, *Montezuma's Daughter*, *The Return of She*, *Lysbeth*, *Benita*, *Queen Sheba's Ring*, *The Mahatma and the Hare*, *The Holy Flower*, *The Ivory Child* and *The World's Desire*, the latter in collaboration with Andrew Lang. His works are of slight artistic value, but hold the attention by reason of their peculiar scenes and incidents.

HAGUE, THE, called for years the "peace city" of the world, the capital of the kingdom of the Netherlands, or Holland. It is situated three miles from the North Sea, in the province of South Holland, thirty miles southwest of Amsterdam. Commercially the city is not as important as its general reputation would indicate, for its manufactures are not extensive and it has no harbor; however, the railroad system of Holland was planned with The Hague as its center.

The city's claim to unusual fame lies in the fact that it is the home of one of the most popular sovereigns of Europe—Queen Wilhelmina—that here the government of the country is centered, that the world's Peace Palace is here, and that art lovers from everywhere visit The Hague galleries, where they may see nearly 500 of the world's great paint-

ings, largely by the Dutch masters. Moreover, there are more stately buildings in The Hague than in any other city of the little kingdom. The government and municipal buildings, picturesque churches, libraries, galleries and museums are on broad streets shaded by linden trees and intersected everywhere by the inevitable Dutch canals.

Dutch learning and culture is everywhere manifest. The most notable of the learned societies is The Hague Society for the Defense of the Christian Religion, founded in 1785. There is a Royal School of Music, an educational institute of the Free Masons, an artists' association known as Pulehri Studio, and the Netherland-India Institute. Overshadowing all these in the estimation of the average man is the International Peace Palace, a gift to the nations by Andrew Carnegie (see PEACE CONFERENCE, INTERNATIONAL).

Some of the few manufactured articles indicate the aesthetic trend of the people; those of which they are proudest are manufactories of porcelains and gold and silver ware. Guns are made here, also, and there are machine shops and brass works and hat, furniture and carriage factories.

The city was originally the hunting center of the counts of Holland. In 1250 it became a princely residence and in the sixteenth century was the seat of the States-General. From this it became the capital of Holland. The Hague has held an important position among European capitals; many important treaties have been negotiated there, including the Triple Alliance of England, France and Holland, and in 1899 it was the seat of the International Peace Conference, which established there a permanent court of arbitration. Population, 1934, 469,168.

HAGUE PEACE CONFERENCE. See PEACE CONFERENCE, INTERNATIONAL.

HAHN'EMANN, SAMUEL CHRISTIAN (1755-1843), the founder of the homeopathic system of medicine, born at Meissen, Germany. He studied medicine at Leipzig, Vienna and Erlangen and took his degree at Erlangen in 1779. After practicing in various places, he published in 1810 his great work, which fully explained his new system of curing any disorder by employing a medicine which produces a similar disorder. Hahnemann was driven from Saxony when the government prohibited him from dispensing medicines, but he found an asylum ultimately in Paris, where his system was

authorized by the government and acquired great popularity. His works of *Materia Medica*, his essays on *Poisoning by Arsenic* and *Effects of Coffee* and his treatise on *Chronic Affections*. The principles advocated by Hahnemann are explained in detail under the heading HOMEOPATHY.

HAIG, hage, First EARL (DOUGLAS), (1861-1928), one of the greatest military leaders of the World War, commander in chief of the British Expeditionary Forces in France and Belgium after 1915. He entered the army in 1885 as a member of the Seventh Hussars, served with distinction in Africa and India, and rose steadily in rank, attaining the position of general officer commanding at Aldershot in 1912. On the outbreak of the World War he was made commander of the first army corps which went with the British Expeditionary Force to France, received the grade of general, and in December, 1915, succeeded Sir John French (which see) as commander in chief. In 1917 he was raised to the rank of field marshal. The British armies won brilliant successes under his leadership, and he was considered one of the ablest commanders acting under Foch. See WORLD WAR.

HAIL, small masses of ice or frozen rain which fall from the clouds in showers or storms. Hailstones vary in their form, being either angular, pyramidal or star-shaped. Sometimes they are as hard as ice and sometimes as soft as snow. At the center there is generally an opaque spongy mass, resembling sleet in its composition, and round this a semitransparent frozen mass, consisting of a succession of layers of ice, is formed. Properly there are two kinds of hail, the small grains, which generally fall in winter and usually before snow, and the large masses, which fall chiefly in spring and summer. The small-grained hail is probably formed by the freezing of raindrops as they pass in falling through colder air than that from which they started. The large hail is probably due to the meeting of two currents of air, of very unequal temperature and electric tension. Hailstones are usually about one-fourth of an inch in diameter, but they are occasionally of much larger dimensions, being sometimes even three or four inches in diameter. In hot climates hailstones are very destructive to crops. In regions where summer hailstorms are prevalent, farmers usually purchase hail insurance.

HAIL COLUMBIA, a patriotic American song, written in 1798 by Judge Joseph Hopkinson. It was composed for the benefit of a young actor, who sang it to the tune of *The President's March*, an air composed ten years previously in honor of President Washington. The piece possesses little musical merit, but appeals to popular taste and is a favorite national air.

HAINAN, *hi nahn'*, an island in the China Sea, separated from the mainland by Hainan Strait, a channel encumbered with shoals and coral reefs. The island has an area of 13,600 square miles and constitutes a part of the Chinese province of Kwang-tung. The interior, which is mountainous and covered with forests, is inhabited largely by a distinct race, still in a very primitive stage. The lowlands are fertile and produce rice, coconuts and sugar-cane. The neighboring fisheries are an important source of revenue. The capital is the treaty port of Kiung-chow, and the island has a population of more than 2,500,000.

HAIR, the covering of the skin of mammals. It has the same use as feathers in birds and as scales in fishes and reptiles, and it varies from the finest wool to the quills of the porcupine and the bristles of the hog. The human body is naturally covered with long hair only on a few parts, yet nearly all parts produce a fine, short, colorless, sometimes hardly perceptible hair. The only places entirely free from it are the palms of the hands and the soles of the feet.

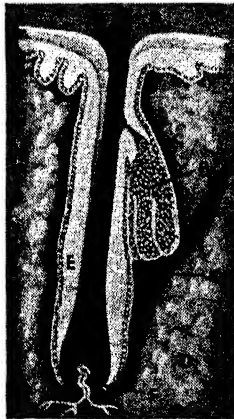
Each hair consists of a shaft—the part outside the skin, which does not grow—and a root, imbedded in the skin, which expands at its lower end into a swelling, or bulb, composed of little cells. It grows by forming new cells, which press the old ones forward to become part of the shaft. Each hair is said to live from two to four years. If the root is destroyed there is

no means of reproducing the hair; but if the hair falls out, as is often the case after nervous fevers, it will grow again within a few weeks.

The color of the hair is due to pigment in the cells. Gray hair is caused by a deficiency of pigment. Baldness is caused by death of the papilla, or hair bulb, generally due to lessened circulation of the blood in the scalp. Connected with the bases of the hairs are small glands, called *sebaceous glands*, which secrete an oily substance that serves to keep the skin, as well as the hair, soft. Hair tonics and hair dyes should usually be avoided. By keeping the scalp clean and massaging it with the fingers, one can generally keep the hair in a healthful condition.

Hair, chiefly from the horse, the ox, the hog, the goat, especially the Angora or Mohair goat, the camel and the alpaca, is used for manufacturing purposes. That of the first three is used mostly for upholstery, the short hair being manufactured into curled hair for stuffing, and the long, straight hair being made into haircloth for seating. The long hair is also used for making fishing lines and brushes. White hair, because it can be easily colored, is used in the manufacture of fancy articles. The finer brushes, or hair pencils, of painters are made from the hair of the sable and the marten. The hair of the goat, the camel and the alpaca is chiefly used in combination with wool and other fibers for spinning and weaving into dress fabrics. Wigs, curls and beards are made from human hair. In every case and for any purpose hair taken from the living subject is best.

HAIR DRESSING. From the earliest times the care of the hair has been an important part of the toilet. The ancient Assyrians, Babylonians, Persians, and Egyptians curled the hair and beard with the utmost care and even wore wigs and false beards. The Hebrews gave much attention to the hair and considered a bald head a disgrace. The Greeks considered abundant hair one of the greatest marks of beauty, and Homer counts it among the gifts of Aphrodite. Examples of the various styles of hair dressing which obtained among the Greeks in very ancient times are seen in statues. Some of the arrangements were very elaborate, both for men and women. By the fifth century B. C., men began to cut their hair short, while the women developed even more elaborate styles



SECTION THROUGH THE ROOT OF A HAIR

a, Shaft of the hair; b, sebaceous gland; c, muscle that raises the hair; d, fatty tissue; e, root sheath; f, vessels that nourish the hair.

The custom of wearing false hair was brought from Asia to Greece and was for a time very popular.

Until about 300 B. C. the Romans wore long hair. Even at the time of Cicero the custom prevailed to a certain extent, although the warriors and artisans of the period wore short hair. In early times the Roman women wore their hair either flowing over the shoulders or gathered into a simple knot, but from the time of Augustus Caesar the fashions became more and more elaborate.

During the greater part of the Middle Ages the hair was worn very simply, but by the fourteenth century most elaborate coiffures began to appear. The men during the fifteenth and sixteenth centuries wore their hair rolled back from the forehead in a fashion similar to the later pompadour style for women, and their beards were tightly curled and gummed so as to stand out like a fan. For women, about this time it was fashionable to wear a broad cushion, or coronet, resting on a great mass of curled or crimped hair. Louis XIV of France had very long and abundant hair, and the desire of his courtiers to imitate him brought about the introduction of long curled wigs. The custom of wearing wigs was general for about a century after 1650. From about 1640 to 1670 women wore their hair curled and falling over the shoulders and covered with a veil of gauze. Toward the close of the seventeenth century, however, more elaborate fashions returned, and tall headdresses of lace and starched cambric were used. Under Louis XVI of France, hair dressing reached a point of elaboration which has been approached at no other period. The women built their hair into a sort of tower, which they stiffened with wire or haircloth and upon which they wore a little cap or hat. There is a record of one style in which this hat was replaced by a model of a ship of war.

By the beginning of the nineteenth century, elaborate hair dressing for men had entirely gone out of fashion, and in most countries men wore short hair. In the early part of the century women dressed the hair very simply, letting it fall at the sides in a series of ringlets and catching it at the back of the head with a ribbon. This was gradually superseded by an arrangement of the hair on top of the head. During this period the hair was often arranged over a large roll, in a style known as the *chignon*, or waterfall.

The general tendency during the last half century among civilized people has been toward simplicity in hair dressing.

HAIR DYE, a preparation for changing the natural color of the hair. The hair is darkened by solutions of salts of mercury, silver lead, bismuth, or sulphide of potassium. It is lightened by peroxide of hydrogen. A wash made by steeping henna leaves will give the hair a reddish tint. Hair-dyeing is at best unsatisfactory, and many dyes are poisonous. It is considered by most people the part not only of prudence but of good taste to shun them.

HAIRLESS DOG, the general name for those breeds of dogs whose bodies are almost entirely lacking in hair. Such dogs are found in various parts of the world. The Chinese have a small species of the greyhound-terrier type, which they esteem as a table delicacy. A hairless dog of ferocious temper is used in the eastern part of India in hunting. When the Spaniards invaded Mexico they found there a large dog devoid of hair, the puppies of which were eaten by the natives. In America, the few in favor as pets are quite small.

HAIR WORM, the common name for a number of slender worms. See *TRICHINA*.



HAITI, *ha'te*, excepting Cuba, is the largest island of the West Indies. Cuba, which is fifty miles northwest, is separated from it by the Windward Passage. Porto Rico is about seventy-five miles east, and Jamaica is 110 miles west by south. Haiti is 400 miles long and from 55 to 150 miles wide, and has an area of 28,250 square miles. It contains the republic of Haiti, once a colony of France, and the republic of Santo Domingo.

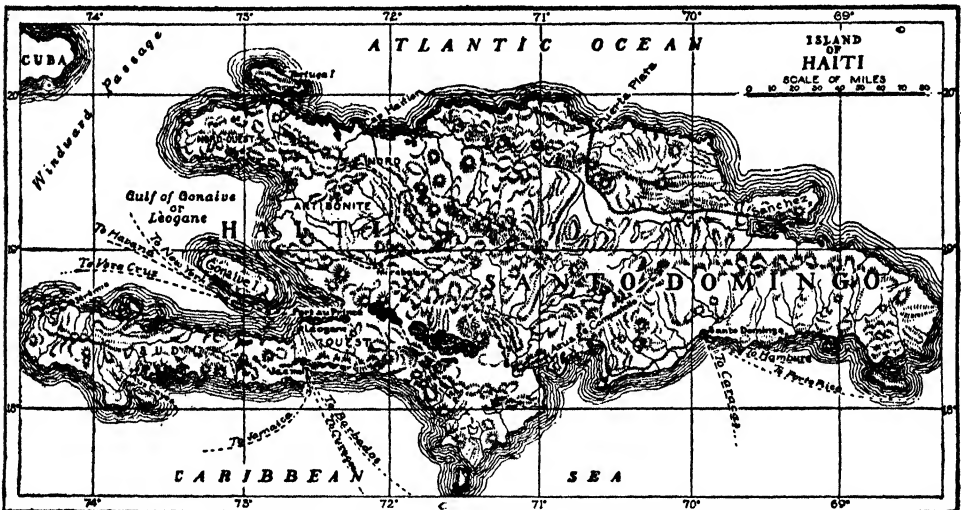
The Republic of Haiti. Haiti is the most westerly and the smaller of the two divisions of the island; its area is 10,204 square miles, and its population in 1935 was believed to be 2,550,000. Nearly all the people are negroes; of the 6,000 foreigners only about 3,000 are white. Port-au-Prince (population, about 125,000) is the capital; Cape Haiti has

22,000; Gonaives, 10,000. The official language is French, though most of the natives speak a dialect known as Creole French.

Haiti is an agricultural country, tropical in its climate, and its products are those of ever-warm countries. Sugar cane is extensively raised, and the country has several large sugar-making establishments. The cultivation of tobacco is a growing industry, and the allied business of cigar and cigarette making prospers. However, the most important product is coffee, and it is of excellent quality. Cocoa and cotton are exported in considerable quantities. Rum is made, but the whole output is consumed at home. Mineral resources of gold, silver, copper, iron, tin,

The President is elected for six years, by the two chambers in joint session.

History. Haiti was discovered by Columbus in 1492, and the first permanent colony established by the Europeans in the western hemisphere was planted on the coast, the town of Santo Domingo being founded in 1496. For a long time the island belonged to Spain, but in 1600 the French began to settle here, and in 1697, by the Treaty of Ryswick, the western part was ceded to France. Most of the inhabitants were slaves, and in 1791 a fierce insurrection of the negroes broke out. They were led by Toussaint L'Ouverture, who established an independent republic and ultimately ruled as dictator over the



THE ISLAND AND THE TWO REPUBLICS

nickel gypsum and limestone are as yet in an undeveloped state.

Communication. There is regular steamship connection between the ports of Haiti and New York, but only an average of two vessels a week visit the country. There are about 160 miles of railroad, American-owned. The All-American Cable Company has a cable to Haiti, connecting with 1,500 miles of land telegraph wire. Other cables connect directly with New York and South America. There is a government telephone system embracing 1,200 miles of line.

Government. This negro republic is governed under a new constitution, adopted in June, 1918. The legislative power is vested in a Chamber of the Communes of thirty-six members and a Senate of twenty members.

whole island. In 1802 Bonaparte waged war against him, and he was seized and taken to France. The next year the negroes rose and drove out the French. After the brief rule of Dessalines the Spaniards regained the eastern portion of the island. Most of its history has been marked by revolutions and insurrections, but order has been maintained since 1915, when the National Assembly ratified a treaty by which a virtual protectorate was established over Haiti by the United States. In 1934 this was supplanted by a customs representative.

HAKE, a marine fish related to the cod family. The North American silver hake abound off the northeastern "Banks," where they are caught with cod. They are usually eaten fresh, though some are smoked and

dried. The average weight is five pounds. The flesh is rather coarse and flaky. About 50,000,000 pounds of these fish, having a market value of close to a million dollars, are caught annually. A species of hake is found on the Pacific coast.

HAKODATE, *hak ko dah'te*, JAPAN, the most northerly of the old treaty ports of the empire, opened to trade in 1859. Its location is at the southern end of the island of Yezo. There are a town hall and a naval school, and here are located American and English missions. The people are engaged in fisheries, in sulphur mining and in the making of charcoal. After a very destructive fire in 1907 the town was rebuilt on a very substantial basis. Population, 1930, 197,252.

HALCYON, *hal'se on*, an old or poetical name of the kingfisher. It was a fanciful belief that the bird laid its eggs in nests that floated on the sea and had power to quiet the winds and waves during the period of incubation. From this superstition comes our term *halcyon days*.

HALE, EDWARD EVERETT (1822-1909), a Unitarian clergyman, philanthropist and author, son of Nathan Hale, a journalist, was born at Boston. His early education was received at the Boston Latin School. He was graduated from Harvard University in 1839 and settled as pastor of a Unitarian church at Worcester, Mass., in 1846. Ten years later he returned to Boston and took charge of the South Unitarian church and remained its active pastor forty-five years.



He always EDWARD EVERETT HALE showed a keen interest in all reforms and progressive movements. He founded, and for a long time edited, the *Christian Examiner*, a Unitarian weekly, and *Old and New*, which in 1875 was merged with *Scribner's Monthly*. He became widely known as a brilliant lecturer and an able writer, and has been called "The American Defoe," because of the strong semblance of reality in his romances. This is

well illustrated in *The Man Without a Country*, a story which has done much to stimulate American patriotism. (This story is related elsewhere under its proper heading.) Of his later writings the most important are *Philip Nolan's Friends*, *The Story of Massachusetts*, *A New England Boyhood*, *Lowell and His Friends*, *Memoirs of a Hundred Years* and *Ten Times One is Ten*. The last led to the founding of such charitable clubs as King's Daughters, Lend-a-Hand and others. He also wrote and edited many important historical works. The last six years of his life he was chaplain of the United States Senate.

HALE, NATHAN (1755-1776), an American soldier and hero, whose dying words are still quoted as an expression of the highest form of patriotism. Nathan Hale was born at Coventry, Conn. In 1773 he was graduated at Yale, and he taught school in East Haddam and New London, Conn., until the outbreak of the Revolutionary War. He enlisted as a volunteer, became a lieutenant in Colonel Webb's regiment and was assigned recruiting duty in New York. On Washington's call for a volunteer to enter the British lines and procure intelligence, he responded. Disguised as a Dutch schoolmaster, he visited all the enemy's camps in New York and Long Island, made drawings of the works and obtained all the information required. When about to return he was arrested as a spy, tried and condemned to be hanged. The execution took place in New York City. Just before the noose was placed about his neck he said, "I only regret that I have but one life to lose for my country." Statues have been erected to him in Hartford, Conn., and in City Hall Park, New York.

HALÉVY, LUDOVIC (1834-1908), a French novelist and dramatist, was born at Paris. Much of his work was done in collaboration with Henri Meilhac. This includes librettos of Offenbach's light operas, notably *La Belle Hélène* and *La Barbe Bleue*, which brought him fame, and the serious though sensational drama *Frou-Frou*, written in 1869, one of the greatest theatrical successes of the century. The two also wrote numerous farces. Their best work is *Tricote et Cacolet* and *La Boule*. Halévy wrote, without collaboration, the well-known novels *L'Abbé Constantin* and *Criquette*. Late in life he was made Chevalier of the Legion of Honor and (1900) Commander. He was also elected to the French Academy.

HALFTONE, a process of making, from photographs and engravings, plates which resemble electrotypes. The process of making halftones is somewhat complicated. Engravings, photographs and drawings can be reproduced by this method, but photographs give the best results.

The first step in the process consists in making a negative of the picture, in a camera containing a screen specially prepared for the process. This screen consists of two glass plates, ruled with parallel lines, which are very close together. The lines cross the plates diagonally and are so drawn that when the two plates are placed together they form diamond-shaped checks. These plates are cemented together with Canada balsam and placed in the camera near the plate upon which the negative is made. It is by means of these screens that the dots which give the shadow effect in the halftone are produced. (Observe one of the halftone illustrations in this volume under a magnifying glass.) The dots covering the portion of the picture which has the high lights are lighter and larger than those covering the portions in shadow, so that the lights and shadows in the picture are exactly reproduced in the negative.

After the negative has been developed, it is carefully removed from the plate and laid face downward upon the sensitized copper plate upon which the halftone is to be made. The copper plate is prepared by planing and polishing; it is then covered with a thin film of sensitized material, upon which the photograph is made. This material hardens under the action of light; and if the plate and the negative be exposed to an electric light for a few moments and the sensitized plate be "developed" in certain chemicals, a reproduction of the picture is left upon the copper. By washing, those portions of the sensitive film which were not acted upon by the light are dissolved away, leaving the others to protect the surface of the copper. The plate is then placed in an acid bath and etched (See **ETCHING**), after which it is cleaned and is then ready for printing.

The fineness of the halftone depends upon the number of lines on the screen. For halftones of the best grades from 150 to 200 lines to the inch are used. Poorer grades contain coarser screens, and in these the checks are plainly seen; coarse screens are necessary when a poor quality of paper is used in printing. See **PHOTOGRAPHY**.

HALIBURTON, THOMAS CHANDLER (1796-1865), a Canadian humorist and judge, was born at Windsor, Nova Scotia, and received his education at King's College, in his native town. He was called to the bar in 1820 and soon distinguished himself. At the age of thirty-two he was appointed chief justice of the Court of Common Pleas for Nova Scotia and in 1840 was promoted to the Supreme Court. After two years he resigned and removed to England, where he was for six years a Conservative member of Parliament. Despite his brilliant career as a jurist it is as a humorist and satirist, under the pen name of "Sam Slick," that he is best remembered.

The Sam Slick sketches, which first appeared in a local paper, pictured a Yankee clockmaker, whose shrewd sayings and knowledge of human nature won immediate recognition. These sketches were collected and published in 1837 under the title of *The Clockmaker, or Sayings and Doings of Samuel Slick of Slickville*. A second series of Slick stories appeared in 1838, and a third in 1840. He also wrote *The Old Judge*, *The Letter Bag of the Great Western* and *Traits of American Humor*.

HALIBUT, the largest of the flatfishes and an important article of food. Some specimens reach a very large size—six to eight feet in length—and weigh over 300 pounds. Those which weigh about seventy-five pounds are most desired for food, as the flesh is then tenderest. The halibut lies on its left side, with its right side, in which are both eyes, uppermost. It is white beneath and dark brown above. It abounds in all northern seas, and nearly 70,000,000 pounds are caught yearly, by the same methods as are employed in cod fishing.

Halibut prey upon smaller fish and crustaceans, and are themselves devoured by seals, whales and sharks.

HALIFAX, ENGLAND, a prosperous center of woolen and worsted manufacture, situated in West Riding, in York County, 194 miles northwest of London. The carpets made in Halifax are known everywhere for their superior quality, and the place also has iron, machine and chemical factories. Situated at the junction of two small rivers and in a rich coal district, and with excellent railroad facilities, Halifax is well located for industrial growth. There are extensive stone quarries in the neighborhood. The town

is well built and is progressive and modern in administration. Among its features of interest is an old inn where part of *Robinson Crusoe* was written. Population, 1931 census, 98,122.

HALIFAX, NOVA SCOTIA, the largest Canadian city on the Atlantic Ocean and one of the principal cities in British North America. It has one of the world's finest harbors, which is never closed by ice. The main part of the city rises on slopes at the western end of the harbor. It is the terminus of the Canadian Pacific and the Canadian National railways, and it also has a smaller road known as the Halifax & Southwestern.

Halifax is the nearest Atlantic Ocean port to Europe, and it has achieved considerable commercial advantage from such location. To accommodate for all time increasing ocean traffic the Canadian government has spent \$30,000,000 in improvement of the harbor and terminal facilities. The work was begun in 1914. The landing quay is half a mile long, and six piers are each an eighth of a mile in length. Steamers dock at one end of the terminal, and trains bound for the Pacific side of the continent start from the other end.

Halifax is also important industrially. It has Canada's largest sugar refinery, and a great oil refinery. It has extensive fish-curing and packing plants, and meat packing establishments. It is the seat of the Provincial Parliament, Dalhousie University, Nova Scotia College, and the Halifax Ladies' College.

In 1917, an explosion of a munition vessel in Halifax harbor caused the destruction of many ships and several miles of the city frontage, also of Dartmouth, across the bay, with a heavy loss of life. Population, 1931, 59,275.

HALL, ASAPH (1829-1907), an American astronomer, born in Goshen, Conn., and educated in Central College, New York, and at the University of Michigan. In 1862 he became an assistant in the naval observatory at Washington, and in the following year was made professor of mathematics in the same institution; but in 1891 he left the government service with the rank of captain. Hall was sent with various scientific expeditions undertaken by the government, amongst which were those to Bering Strait in 1869, to Colorado in 1878 and to Vladivostok, Siberia, in 1874, to observe the transit of Venus. The greatest of his numerous discov-

eries was finding the two moons of Mars, and his most important work a study of the double stars. For six years he was professor of astronomy at Harvard.

HALL, G[RANVILLE] STANLEY (1845-1924), an American educator, the first president of Clark University, a pioneer in the science of experimental psychology, and an innovator in the field of child study. He was born in Ashfield, Mass., and was educated at Williams College, Union Theological Seminary, Harvard University and abroad. In 1872 he became professor of psychology at Antioch College, Ohio; in 1878 he received his doctor's degree at Harvard, and in 1880 was appointed lecturer on psychology at the university. Appointed professor of psychology at Johns Hopkins in 1881, Dr. Hall organized at that university one of the first psychological laboratories in the country. In 1888 he was signally honored by election to the presidency of Clark University, at Worcester, Mass. From 1888 until his resignation in 1920, he was professor of psychology at the university, as well as its president.

Dr. Hall was a practical psychologist rather than a theorist, and was a leader in adapting methods of instruction to the new "science of human nature." In 1887 he founded the *American Journal of Psychology*, the first of its kind to be published in the United States, and he was a voluminous writer in his chosen field. Among his many books are *Adolescence*, *Founders of Modern Psychology*, *Morale: the Supreme Standard of Life and Conduct* and *Confessions*.

HALLAM, HENRY (1777-1859), an English historian. He was educated at Eton and Oxford and studied for the law, but abandoned it for literary pursuits. His contributions to the *Edinburgh Review* brought him into notice, and his *View of the State of Europe During the Middle Ages*, which appeared in 1818, at once established his reputation. His next work, the *Constitutional History of England from the Accession of Henry VII to the Death of George II*, showed, like the first, the solid learning, patient research, accuracy and impartiality of statement which are characteristic of this author's work. In 1839 appeared his last great work, the *Introduction to the Literature of Europe in the Fifteenth, Sixteenth and Seventeenth Centuries*, a useful survey of literary history, though wanting in the fineness of judgment necessary for such

work. His youngest son, Arthur Henry, a youth of high promise, who died suddenly at the age of twenty-two, is the subject of Tennyson's *In Memoriam*.

HALLE, *hahl'e*, GERMANY, usually called HALLE ON THE SAALE to distinguish it from other places of the same name, is an important town in the Prussian province of Saxony, about twenty miles northwest of Leipzig, on the River Saale. Halle has an extensive trade and manufactures of chemicals, oil, malt, dyes, agricultural machines and salt. The latter is mined in large quantities on an island in the Saale. Among the most beautiful buildings is the town hall, erected in the fifteenth century. Population, 1933, 209,175.

The University of Halle, founded in 1694 as a Lutheran theological school, is one of the leading universities in Germany. In 1817 the University of Wittenberg was united with it. The school is very prosperous, maintains the usual departments of literature, theology, and science and gives special attention to instruction in agriculture. The number of students is usually about 2,300, and the library contains over 210,000 volumes.

HALLECK, FITZ-GREENE (1790-1867), an American poet, famed as the author of *Marco Bozzaris*. He became a clerk in a New York banking house and for years was in the employment of John Jacob Astor. In 1819, poems by him and a friend appeared in the *New York Evening Post*, under the signature of Croaker & Co, and attracted some attention. It was on the death of this friend that Halleck wrote his most beautiful poem, beginning "Green be the turf above thee." In 1820 he published *Fanny*, his longest poem, a satire on the follies and fashions of the day. Among his other notable poems are *To the Memory of Burns*, *Alnwick Castle* and *Red Jacket*.

HALLELUJAH, ALLELUIA, or HALLELUIA, *hal le loo'yah*, meaning *praise ye the Lord*, is a Hebrew word often occurring in the Psalms. It is retained in translations, probably because its full, fine sound is an eminently appropriate expression of religious praise and rejoicing. The *Great Halleluja* is the name given by the Jews to *Psalms* 113-117, which are sung on the Feast of the Passover and the Feast of Tabernacles. The great "Hallelujah Chorus" in Handel's oratorio *Messiah* is one of the noblest and most inspiring pieces of music ever written.

HALLEY, EDMUND (1656-1742), an English astronomer and mathematician, born in London and educated at Saint Paul's School and at Queen's College, Oxford. He traveled extensively, observing important celestial phenomena, and made a catalogue of the stars of the southern hemisphere. Halley had charge of a voyage in the Pacific for the observation of the stars and was so successful that he was made a captain in the navy with half pay for life. He discovered "Halley's comet" in 1680; in 1703 he became a professor of geometry at Oxford, and ten years later secretary of the Royal Society which position he held until his death. A great many important discoveries are accredited to Halley and it was he who first predicted the return of a comet. Newton's calculations of a comet's orbit were based partly on Halley's observations.

HALL OF FAME, a building on the grounds of the New York University, erected as a memorial to famous Americans and completed in 1900. It consists of a colonnade 400 feet long, with provisions for 150 panels, two feet by six, each to bear the name of a famous American. Only persons who have been dead 25 years or more and were born in territory of the United States were originally eligible. Fifty names were to be inscribed at the beginning, and five additional names were to be added every fifth year until the year 2000, when the 150 inscriptions will be completed. The nominations of the public were invited, and these, on being seconded by the senate of the University, were submitted to a board of 100 judges, eminent citizens chosen by the council. The rule requires that no one who receives less than fifty-one votes can be accepted. In 1900, of the 252 names submitted, twenty-nine received the required number of votes; their names follow:

George Washington	Nathaniel Hawthorne
Abraham Lincoln	George Peabody
Daniel Webster	Peter Cooper
Benjamin Franklin	Robert E. Lee
Ulysses S. Grant	Ell Whitney
John Marshall	John J. Audubon
Thomas Jefferson	Horace Mann
Ralph Waldo Emerson	Henry Ward Beecher
Robert Fulton	James Kent
Henry W. Longfellow	Joseph Story
Washington Irving	John Adams
Jonathan Edwards	William E. Channing
Samuel F. B. Morse	Gilbert Stuart
David G. Farragut	Asa Gray
Henry Clay	

The following names were added later:

Elected in 1905: John Quincy Adams, James Russell Lowell, William Tecumseh Sherman, James Madison, John Greenleaf Whittier, Alexander Hamilton, Louis Agassiz, Mary Lyon, Emma Willard, Maria Mitchell.

Elected in 1910: Harriet Beecher Stowe, Oliver Wendell Holmes, Edgar Allan Poe, James Fenimore Cooper, Phillips Brooks, William Cullen Bryant, Frances Elizabeth Willard, Andrew Jackson, George Bancroft, John Lothrop Motley.

Elected in 1915: Mark Hopkins, Francis Parkman, Elias Howe, Joseph Henry, Charlotte Cushman, Rufus Dawes, Daniel Boone.

Elected in 1920: Samuel Langhorne Clemens, James Buchanan Eads, William Thomas Green Morton, Augustus Saint Gaudens, Patrick Henry, Roger Williams, Alice Freeman Palmer.

Elected in 1925: Edwin Booth, John Paul Jones.

Elected in 1930: Walt Whitman, Matthew Fontaine Maury, James A. MacNeill Whistler, James Monroe.

Elected in 1935: William Penn, Simon Newcomb, Grover Cleveland.

HALLOWE'EN, *hal o een'*, or **HALLOW-EVEN**, the evening of October 31. Though the occasion is usually given over to frolics, mischief and entertainments of an hilarious nature, the name means, literally, *Holy Eve*. In fact, October 31 is the eve of the Church festival of All Saints, which occurs on November 1. Long years ago pagan people celebrated All-Saints' Day in honor of the good and evil spirits. See **ALL-SAINTS' DAY**.

Suggestions for Hallowe'en. The observance of Hallowe'en in the school permits an attractive departure from the regular routine, and an enjoyable program can easily be prepared. The decorations for the occasion, such as colored paper figures of cats, witches, goblins, fairies, and the like, afford an opportunity for constructive work that is not without value. Below is a program that should prove suggestive to the teacher:

Song, "The Bogle Man"....Alfred P. Graves.
"Little Orphant Annie".....Riley.
Selection from

"The Goblin Market"....Christina Rossetti.
SongSelected.

"The Fairies"William Allingham.
Spelling ContestAll of the pupils.

Costume DrillGirls.
"The Shoemaker and the Elves"....Grimm.

"Tam O'Shanter"Burns.
Dramatization of "Rip Van Winkle."

Reading from Kingsley's "Water Babies."
SongSelected.

HALLUCINATION, *hal lu se na'shun*, a condition of mind in which a person thinks he sees or hears things that have no existence.

The mind acts without a sensation to produce the action. Hallucinations are to be distinguished from illusions, for in the latter there are real sensations, which are erroneously interpreted. The visions which people experience who are in a state of religious exaltation are hallucinations; an example of illusion is the mistaking of a white object in a lonely region at night for a ghost.

The senses are not equally subject to hallucinations. Hearing is most frequently affected, and then sight, smell, taste and touch, in order. Hallucinations of several senses may exist simultaneously in the same individual, and these may be complicated with certain illusions. The simplest form of hallucination of hearing is the ringing in the ears; but the striking of clocks, the sounds of musical instruments and of the human voice are often heard in imagination. Hallucinations are not confined to those whose mental faculties are disordered. Occasionally they appear in healthy persons, and the individual is fully conscious of the unreality of the objects that affect his senses. Sometimes after long periods of intense mental work, troublesome hallucinations may appear, but rest will drive them away.

HA'LO, the name given to colored circles of light sometimes seen around the sun or moon, and to other similar luminous appearances. These phenomena are classified as (1) *halos proper*, consisting of complicated arrangements of arcs and circles of light surrounding the sun or moon, accompanied by others tangent to or intersecting them; (2) *coronas*, simple rings, generally somewhat colored; (3) *aureolas*, bright rings surrounding shadows projected upon a cloud or fog-bank, or the colored rings observed by aeronauts on the upper surface of clouds. All these appearances are the result of certain modifications which light undergoes by reflection, refraction, dispersion, diffraction and interference, when it falls upon the crystals of ice or the raindrops that constitute clouds.

HALOGENS, *hal'o jenz*, a collective name given to a group of four chemical elements which have points of similarity. They are bromine, chlorine, fluorine and iodine, each of which is described in these volumes. The name means *sea salt producer*, and it applies to these elements because each in compound with other substances forms salt resembling common or sea salt.

HALS, *hahls*, FRANS (1584-1666), a famous portrait and genre painter; of Dutch artists, he was second only to Rembrandt. Hals was born at Antwerp, but moved to Haarlem, where he studied under good masters and was held in high esteem throughout his jovial, care-free life. He was one of the greatest portrait painters of all time. Character and expression were his chief concern, and all details were made to emphasize the impression he wished to produce. He painted a great variety of types, but whatever his subject it was rendered with the utmost sympathy and faithfulness. Not only in the field of portraiture, but also in genre (portrayal of scenes of everyday life) he was preëminent. The spirit of his *Fool Playing the Lute*, of *The Jolly Trio*, of *Hille Boble*, representing an old woman turning from a tall open mug to grin broadly at a pet owl perched on her shoulder, is inimitable, and has given to Hals the title "father of Dutch genre painting." See **GENRE PAINTING**.

HAM, according to *Genesis* VI, 10, one of the three sons of Noah. He was the reputed ancestor of the North African races, and from this circumstance came the name *Hamites*, applied to those people in standard classifications of the human race.

HAM, the name usually given to the cured thigh of the ox, sheep or hog, particularly the last. The curing of hams forms an important part of the meat-packing industry. For ordinary trade they are first pickled in brine, then smoked in large chambers, built especially for the purpose. Each nation has its own method of curing hams, and the packing houses try to conform to these customs for their export trade. See **PORK**; **MEAT-PACKING**.

HA'MAN, a favorite of King Ahasuerus, of Persia, whose story is related in these volumes in the article **BIBLE**, subhead *Bible Stories*.

HAM'BURG (in German, *hahm'boork*), GERMANY, the greatest commercial port on the continent of Europe, situated about eighty miles from the North Sea. It lies on a low plain along the north branch of the Elbe, 178 miles by rail northwest of Berlin, the only city in Germany exceeding it in population. The trade volume lost to Hamburg through the World War was largely regained during the twenty years following. From the Elbe proceed canals which intersect the business

part of the city in all directions, while the River Alster, flowing across it, forms two large basins known as the Binnenalster and Aussenalster. The canals and Elbe are spanned by many fine bridges.

Around the Alster basins are grouped the modern sections of the city, and here are beautiful drives and many imposing buildings. Among the notable structures is the Saint Nicholas Church, whose beautiful spire towers 482 feet. The business section is at all times a scene of great activity, and the harbor is one of the finest in the world. From it small freighters proceed up the canals to the scores of warehouses along their banks. Hamburg is a famous coffee market, a ship-building center of first rank, and a center also of banking, exchange and marine insurance. In normal years it is an embarkation point for thousands of emigrants. Population, 1933, 1,129,307.

Free City of Hamburg, or Hamburg Free State, existed until 1934 as a separate administrative unit within Germany, with its own government (a senate and a house of burgesses), independent in all its governmental aspects, but at the same time a constituent state of the German nation. In 1934, by order of the dictator, Adolf Hitler, all state lines in Germany were abolished, and the former states became simply administrative units under control of an official responsible personally to the head of the government.

HAMIL'CAR BARCA, *bah'h'kah*, a great Carthaginian general, the father of Hannibal. While still a young man he was appointed to the command of the Carthaginian forces in Sicily, shortly before the close of the first Punic War, when the Romans were masters of almost the whole island. For several years he defied all the efforts of the Romans to dislodge him; but the defeat of the Carthaginian admiral, Hanno, compelled him to evacuate Sicily. He then entered on a series of campaigns in Spain, where he founded a new empire for Carthage. He had brought the whole southern and eastern part of the country under Carthaginian rule when he was slain in a battle against the Vettones, in 228 B. C. His plan to make Spain a base for attack against Rome was ably carried out by his son-in-law, Hasdrubal, and his son, Hannibal.

HAMILTON, ALEXANDER (1757-1804), a distinguished American statesman, one of the foremost among the builders of the American

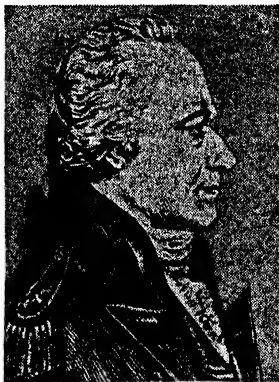
republic, was born in the island of Nevis, West Indies. At the age of sixteen he became a student in Columbia College, New York, and early contributed some powerful letters to the discussion of pre-Revolutionary issues. On the outbreak of the war he received (1776) a commission as captain of artillery; Washington soon appointed him his aide-de-camp and employed him in the most delicate and difficult affairs.

In 1781 he left the service, studied law, became a delegate to Congress from the state of New York in 1782 and in 1787 was a conspicuous member of the convention called to revise the Articles of Confederation. He was a strong supporter of centralized government and on the Constitution as completed, and by the letters which he wrote, afterward published under the title of *The Federalist*, he exerted great influence in favor of its ratification.

On the organization of the government in 1789, with Washington at its head, Hamilton was appointed Secretary of the Treasury. In this office he displayed a remarkable grasp of problems, being responsible for the establishment of a national bank and a United States mint, for the organization of a capable Treasury Department, for the imposition of customs and excise duties and for the assumption by the nation of the Revolutionary debts of the states.

He resigned in 1795 and retired into private life. In 1798 he was appointed second in command of the provisional army, in the fear of a French war, and on the death of Washington, in 1799, he became commander in chief. In 1804 he became involved in a political dispute with Aaron Burr, then candidate for the governorship of New York, accepted a challenge for a duel and was mortally wounded. Hamilton was distinguished as soldier, author, debater, legislator, financier, lawyer and administrator.

HAMILTON, OHIO, the county seat of Butler County, twenty-five miles north of



ALEXANDER HAMILTON

Cincinnati, on the Miami River and the Miami & Erie Canal, (not now used) and on the Erie, the Pennsylvania and the Baltimore & Ohio railroads. The industries include paper, flour and woolen mills, foundries, machine shops, engine works, large safe and bank-vault factories, felt products and manufacturing of tools, agricultural implements and other articles. In some of these products Hamilton leads the United States in output; this is particularly true of its paper mills and its manufacture of safes and vaults. The surrounding country is agricultural. Among the notable buildings are a courthouse, Mercy Hospital, a Y. M. C. A. building and a great high school. A severe flood occurred in 1913; it was followed by the construction of engineering works to prevent future disasters of the kind. General Arthur Saint Clair built a fort here in 1791 and called it Fort Hamilton, in honor of Alexander Hamilton. A settlement grew up around this and was first incorporated in 1810. Population, 1920, 39,675; in 1930, 52,176.

HAMILTON, ONTARIO, founded in 1813, and now fifth city in Canada in size, is the capital of Wentworth County, on Burlington Bay and Lake Ontario, forty miles southwest of Toronto, on the Canadian National, the Canadian Pacific and the Toronto, Hamilton & Buffalo railroads. It is a city of diversified industries, and has more than five hundred factories, including cotton mills, flour mills, International Harvester works, Firestone Tire factories, wire works, screen works, canning factories and rolling mills. Large amounts of American industrial capital are invested in Hamilton. It is in the center of a rich fruit region. There are numerous parks and squares for recreation purposes. There are normal and technical schools and a collegiate institute. It is the seat of McMaster University, formerly located at Toronto. Population, 1931, 155,547.

HAMLET, a prince of Denmark who, according to tradition lived about 200 B. C. Shakespeare's famous tragedy follows closely, in its main outline, the semilegendary story of Hamlet, but varies in many of the details. According to the legend, Hamlet's father was killed by his own brother Fengo, after which the murderer ascended the throne. To save his own life, Hamlet pretended to be insane, and his mother helped him to avenge his father's death. In the play the murderer

marries the king's widow, and the whole plot is revealed to Hamlet by his father's ghost. To conceal his plans for vengeance Hamlet feigns madness. The character of Hamlet is one of the most fascinating subjects for study in all dramatic literature, and has been interpreted on the stage by the world's greatest actors.

HAMLIN, HANNIBAL (1809-1891), Vice-President of the United States in the first Lincoln administration, was born in Maine. He practiced law and served as a member of the Maine legislature from 1835 to 1840. In 1842 he was elected to Congress and served until 1846, commanding attention as an anti-slavery man. In 1848 he became United States Senator as a Democrat and was re-elected in 1851, but joined the Republican party when it was organized. He was elected governor of Maine in 1856. He returned to the Senate the following year, but was elected Vice-President in 1860, was again chosen United States Senator in 1869 and served until 1881, when he was appointed minister to Spain.

HAMMER. The common household or carpenter's hammer, is too common to warrant description. The present tool is a development of prehistoric hammers, which consisted of stone, jade or other hard substance fastened with thongs to a handle. The modifications of the hammer to-day include great implements capable of delivering powerful blows. See **STEAM HAMMER**; **TRIP HAMMER**.

HAMMER, THROWING THE, an athletic feat that calls for great strength and a high degree of muscular control. The thrower stands in the center of a circle having a radius of three and one-half feet, and from this point hurls a hammer, which he first swings about his head. The hammer consists of a metal ball, weighing not over sixteen pounds, attached to a handle made of wire ropes or chains, with wooden grips for the hands. The handle may not be longer than four feet. The highest record for hurling a sixteen-pound hammer thus far recorded is about 189 feet.

HAMMERFEST, NORWAY, not the most northerly settlement in the world, but the most northerly incorporated town. It is on the island of Kvalø, about 120 miles north-east of Tromsø. Considering the high latitude, the summers are mild, the average temperature during that season being 57°; the average winter temperature is slightly below

the freezing point. From November 18 to January 23 the sun is not seen, but there is continuous twilight; from May 13 to July 29 it is continuously visible. Fishing is the means of livelihood of the people, of whom there are about 2,300. They market large quantities of cod-liver oil.

HAMMERHEAD, or HAMMERHEAD SHARK, a shark with a head shaped like a double-headed hammer, with eyes at the end of the projections. There are a number of species inhabiting warm seas, and one species is found on the coast of the United States. All are savage and dangerous.

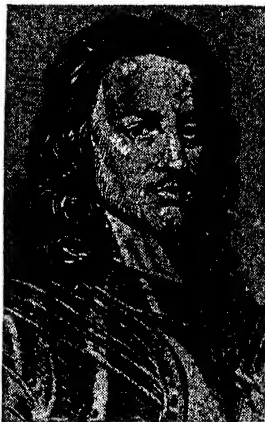
HAMMOND, IND., a city in Lake County, twenty-two miles southeast of the business center of Chicago, on ten trunk-line railroads, the most important being the Baltimore & Ohio, the New York Central, and the Wabash. It has growing importance as a commercial and manufacturing center. The city contains meat-packing plants, brick-yards, tanneries, foundries, flour mills, chemical works and manufactories of steel springs, starch, glue, nails and other articles. Population, 1920, 36,004; in 1930, 64,560, a gain of 79 per cent.

HAMMOND, JOHN HAYS (1855-1936), an American mining engineer, who has been connected with mining operations in two continents. He was born in San Francisco, and was educated at the Sheffield Scientific School of Yale and at the Royal School of Mines in Freiberg, Germany. In 1880 he was appointed special expert on the United States Geological Survey for the investigation of the gold fields of California, and in 1882 was made superintendent of silver mines at Sonora, Mexico.

After serving as consulting engineer to mining and railway companies in America, he became associated with various companies with holdings in South Africa, and while engaged in mining operations in that region became implicated in the Jameson Raid (see **JAMESON, LEANDER STARR**). He was charged with being in the conspiracy against the South African Republic, and was sentenced to death. This sentence was later commuted to fifteen-years' imprisonment, but Hammond was ultimately released upon his payment of a fine of \$125,000. On his return to the United States he became interested in several mining, hydroelectric and irrigation projects, and was a frequent lecturer at universities. In 1910 President Taft appointed him special representative at the coronation of George V.

John Hays Hammond, Jr. (1888—), son of the above, is noted as the inventor of a type of torpedo for coast defense which is controlled by wireless energy from coast fortifications. He has applied for more than 220 patents in the United States and Europe for inventions concerned with radio telegraphy and telephony and torpedoes controlled by wireless energy.

HAMPDEN, JOHN (1594-1643), an English statesman, famous for his opposition to taxation by the king's decree. He entered Parliament at the beginning of Charles I's reign and served in the first three Parliaments (1625, 1626, 1628). Although he attracted some attention in 1627 by refusing to contribute to a forced loan, it was not until ten years later that his resistance to Charles's demand for ship money brought him generally before the public. Although Hampden's contention was the reasonable one—that an inland county should not be forced to pay ship money in time of peace—and although he himself argued his case ably, he was condemned. The popular opposition to the decision against Hampden greatly increased the hatred of Charles I and his arbitrary measures. Of the Short Parliament and the Long Parliament of 1640, Hampden was a member, and he was one of the five members whom the king in January, 1642, attempted to arrest. As commander of a regiment in the Parliamentary army, Hampden took part in a skirmish at Chalgrove Field in June, 1643, and was killed.



JOHN HAMPDEN

HAMPTON, WADE (1818-1902), an American soldier and politician, was born at Columbia, S. C., and educated at the state university for the law, but he never practiced it. He served in both houses of the state legislature and on the outbreak of the Civil War organized and equipped a command of Confederate infantry, artillery and cavalry, known as Hampton's Legion, which rendered

valuable service to the Confederates throughout the war, especially at the first battle of Bull Run and in the Peninsula Campaign. As brigadier-general of cavalry, Hampton accompanied Lee in his second invasion. He was wounded at Gettysburg and in the following August was commissioned major-general. He opposed Sheridan in the Shenandoah Valley in 1864, and for his service in that campaign was made lieutenant-general and commander of all the Confederate cavalry. He was with Johnston in opposing Sherman's northward march from Savannah. After the war he did his utmost to heal the wounds of the South and to foster loyalty to the reunited nation. He was elected governor of South Carolina in 1876 and two years later entered the United States Senate, where he served until 1891. Two years later he was appointed United States commissioner of railroads and served until 1897.

HAMPTON INSTITUTE, a private institution for the education of Negroes established at Hampton, Va., in 1868 under the auspices of the American Missionary Society and through the inspiration of General S. C. Armstrong, who was its first president. The Institute is situated at the southern end of the peninsula which lies between the James River and Chesapeake Bay. The campus of 74 acres contains nearly 140 buildings, including dormitories, a trade school, museum, library with 60,000 volumes, church, and an auditorium seating 2,000 persons.

The institution maintains schools of agriculture, business, education, home economics, library science, music, nursing, a summer school for teachers, and a trade school. The trades taught include automobile mechanics, bricklaying, cabinetmaking, electrical work, forging, painting, printing, sheet metal work, steamfitting, plumbing and tailoring.

Work-year students are new students who are privileged to work for twelve months and thus to pay their own way largely for two years of instruction. Other ways of self-support are also available. The student enrolment is about 2,200; the faculty numbers over 160.

The influence of this institution on the education of the Negro has been beyond measure, since many of its graduates have established similar schools in various parts of the country, the most noted of these being the Tuskegee Institute and Normal School,

established by Booker T. Washington. See **TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE**.

HAMPTON ROADS. See **CHESAPEAKE BAY**; **MONITOR AND MERRIMAC**.

HAMPTON ROADS CONFERENCE, a famous conference held on a vessel near Fort Monroe, February 3, 1865, between President Lincoln and Secretary of State Seward, on the part of the United States government, and Vice-President Alexander H. Stephens and others for the Confederate States of America. The conference was the result of the efforts of Francis P. Blair, who hoped, by securing the coöperation of the Federal and Confederate armies against the French in Mexico, to secure a reunion of the sections and the abolition of slavery. It accomplished nothing.

HAMSUN, KNUT (1859–), one of the foremost writers of modern Scandinavian fiction. His novels, written in Danish, have been translated into more than twenty languages, and in 1920 their author received the Nobel prize for literature. A Norwegian by birth, Hamsun had a long struggle with poverty in his own country and in America before he gained recognition as a writer. His first successful story was published in 1890. Hamsun's vigorous style, originality and intense dislike for the conventions of modern city life are revealed in such novels as *Hunger*, *Growth of the Soil*, *The Woman at the Pump*, *Mysteries*, *Roads Lead On*, and *August*. Among his dramas are *The Game of Life* and *Sunset Glow*.

HANCOCK, JOHN (1737–1793), a Revolutionary patriot and statesman, born in Braintree, Mass. He was a leading figure in the beginning of the Revolutionary struggle, working both with voice and pen, and the attempt to arrest Hancock and Samuel Adams on a charge of treason was one cause of the Battle of Lexington (see **LEXINGTON, BATTLE OF**). Hancock was a member of the Continental Congress from 1775 to 1780, and from 1785 to 1786, and served as president of the body from 1775 to 1777, in that capacity being first signer of the Declaration of Independence. Out of this incident rose the expression "to sign one's John Hancock," meaning to add one's signature. Hancock served as governor of Massachusetts twelve years. As a legislator he was not especially broad-minded or far-seeing, but was always persistent and courageous.

HANCOCK, MICH., in Houghton County, opposite Houghton, on Lake Portage and on the Duluth, South Shore & Atlantic, the Mineral Range, the Chicago, Milwaukee, Saint Paul & Pacific, and the Copper Range railroads. The village is in the Lake Superior copper region, near the famous Calumet and Hecla mines, and contains smelting works, foundries, and machine shops. It is the seat of the only Finnish college in America. The place was settled in 1859, and was incorporated in 1863. Population, 1930, 5,795.

HANCOCK, WINFIELD SCOTT (1824–1886), one of the leading Federal officers in the Civil War, was born in Pennsylvania and educated at West Point. He participated in the important battles of the Mexican War and was brevetted first lieutenant for bravery. In 1861 he was made brigadier-general and given command of a brigade in the Army of the Potomac. He fought at Williamsburg and at Antietam, at Fredericksburg led his men through such a fire as has rarely been encountered in warfare and at Gettysburg was dangerously wounded. In 1866 he was appointed major-general in the regular army, and in the following year was placed for a short time in charge of reconstruction in Louisiana and Texas. In 1880 he was the Democratic candidate for the Presidency of the United States, but was defeated by Garfield.

HAND, the termination of the human arm, corresponding to the paw or claw of the lower animals. The hand is so constructed that with it man can perform not only the ordinary tasks of everyday life, but those requiring the most delicate manipulation. This useful organ, says one authority, possesses the faculty of "opposing the thumb to the other fingers, so as to seize upon the most minute objects—a faculty which is carried to its highest degree of perfection in man." The skeleton of the hand has twenty-seven bones, including the eight *carpal* bones of the wrist. In the palm there are five *metacarpal bones*, and in the fingers and thumb there are fourteen *phalanges*. By means of strong tendons, distributed through the palm, thumb and fingers, and attached to the arm muscles, the fingers can be moved in many different ways, and the thumb has even greater flexibility.

HAND'BALL, a game adapted from one played in Ireland in ancient days. It is so

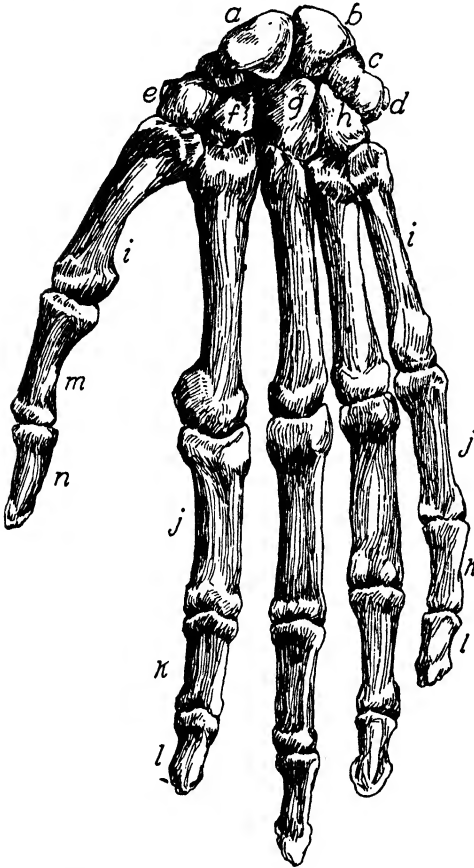
called because it is played with an elastic ball which is struck with the hand against a board or wall. Usually two or four persons make up the opposing teams, but it can be played by three persons. The court consists of a floor, marked off with side and front boundary lines, an upright board which serves as a back wall, and a surrounding field. Mid-

bound, strike against the upright board, rebound from the wall and touch the floor inside the section beyond the service line. If the rebounding ball touches the floor inside the service line it is a *short* ball; if it goes outside the front line of the court it is a *long* ball. In singles a server is out if he serves one long and one short, or two long or two short balls in succession, or if the ball falls outside the side lines of the court. In doubles in such cases the side is out.

A properly-served ball is returned by the opponent's striking it against the upright board. The ball may be struck after the first bounce or while it is in air. If the ball is successfully returned the server bounds it again from the board and the game continues. If the ball is not returned properly the server scores one and begins a new inning. Twenty-one points are considered a game. Full directions in regard to rules and scoring may be found in standard guide books for athletic sports.

HANDEL, GEORGE FREDERICK (1685-1759), a German composer whose oratorios have made his name imperishable. One of these, *The Messiah*, is one of the noblest compositions in all the literature of music. Handel was born at Halle, in Saxony, and at an early age was sent to Berlin to study. He made his debut there as a performer at the age of twelve. For a time he was organist in the cathedral at Halle; afterwards he went to Hamburg, where he played second violin in the orchestra. In 1704 he published his first opera, *Almira*. He visited England twice, and ultimately, having received a pension from Queen Anne, settled there and became head of the newly-founded Royal Academy of Music. He produced in succession the oratorios *Israel in Egypt*, *L'Allegro and Il Penseroso*, *Saul* and *The Messiah*. The last mentioned, which is his chief work, was brought out in 1741, for the benefit of the Foundling Hospital in Dublin. It was not much appreciated at the first presentation, but increased in reputation each year, until to-day it is considered the greatest oratorio ever written. In 1752 Handel became blind, but continued to compose and to play in public. He was buried in Westminster Abbey.

HANDICAP, an extra burden placed upon those who, in competition, have by previous performance showed their ability to do things more successfully than their competitors. In athletic events records are kept of what is



BONY STRUCTURE OF THE HAND

- a, b, c, d, the four bones of superior row of carpus.
- e, f, g, h, the four bones of inferior row.
- i, i, the five metacarpal bones.
- j, j, the first phalanges.
- k, k, the second phalanges.
- l, l, the third phalanges.
- m, n, the two phalanges of the thumb.

way between the rear wall and the front line of the court is a service line drawn parallel to the back wall.

The player who starts the game—the server—stands inside the outer section of the court. He serves the ball by dropping it on the floor on the farther side of the service line. To be properly served the ball must

accomplished by all the men; then some official, who is agreed upon, handicaps those men who need it, in such a way that apparently all are on a fair and even basis. In the races the best men start from the "scratch" and run the full distance, while others are allowed to start at different marks in front of the "scratch" line, according to the decisions of the handicappers. In horse racing the handicap is sometimes accomplished by requiring a heavier jockey to ride the horse or by weighting the saddle. In the various games different methods are used to bring about equality; a golfer is handicapped by being required to allow his opponent a specified number of strokes. No handicaps can be assigned in big field games like cricket and baseball.

HAND ORGAN. See HURDY-GURDY.

HANGBIRD. See BALTIMORE ORIOLE.

HANG-CHOW, *hahn'chow*, or **HANG-CHOO**, CHINA, a capital of the Province of Che-kiang, located southwest of Shanghai, near the southern end of the Grand Canal. It is one of the handsomest cities in China, with many magnificent temples, monuments and triumphal arches. Hang-chow has extensive manufactures of silks, furs, gold and silver ornaments, tapestries, lacquered ware and fans. The greater portion of the inhabitants live without the walls in the beautiful suburbs and in boats on the river. The city is a center of literary activity, and is noted for its wealth. It was opened to foreign trade in 1896. Population, 1927, estimated, 507,000 in the city proper; including suburbs, 730,000.

HANGING, the most common method of inflicting capital punishment. The method is sufficiently described by the sentence which is usually pronounced by the court, that the convict "be hanged by the neck until he is dead." The sentence also fixes the time and place for the execution. Hanging has been generally adopted for the reason that it is generally considered the most humane method of capital punishment, though in recent years it has been superseded in some states by electrocution (see ELECTROCUTION). The execution was formerly a public ceremony, but in later times the tendency has been to avoid publicity.

For details as to means employed in capital punishment in the various states, see that article.

HANGING GARDENS OF BABYLON, a structure of ancient Babylon, celebrated

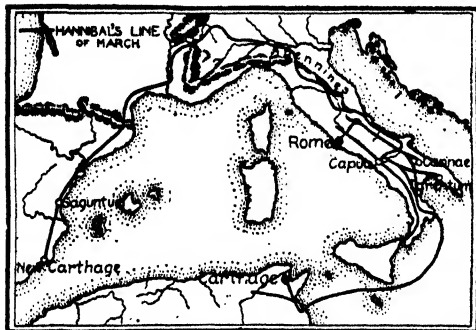
as one of the "seven wonders of the world." It was a sort of pyramid which rose in terraces, was planted with trees, shrubs and flowers, and was intended to simulate a hill. It was built by Nebuchadnezzar for his queen, who on the Babylonian plain frequently grew homesick for the hilly scenery of her native land, Media. See SEVEN WONDERS OF THE WORLD.

HANKOW, *hahn'kou*, CHINA, a town and river port in the province of Hupeh, situated at the junction of the Han with the Yangtse-kiang. The native portion of the city is dirty and crowded, but the foreign settlement, occupied by British, French, Russian and German residents, stretches for three miles along the river and is beautifully laid out, substantially built and well kept. The port of Hankow was opened to foreign trade in 1862 and has become the chief distributing center for the central provinces. The chief articles of export are tea, rice, silk, tobacco, hides, cotton and wood oil. Hankow was captured by Chinese revolutionists in 1912 and made the provisional capital of the republic. Population, 1927, estimated, 778,000.

HANNA, MARCUS ALONZO (1837-1904), an American capitalist and politician, born at New Lisbon, Ohio. He removed with his father to Cleveland, where he acquired large business interests. Turning his attention to politics, he became Republican leader of his ward, city and state, and he was chairman of the Republican National Committee from 1896 to 1904, being special sponsor for William McKinley as a Presidential candidate in the convention of 1896. He was elected United States Senator in 1897 and was reelected in 1903. Hanna was identified with the National Civic Federation, was for a time its president and was always one of its most important and useful members.

HANNIBAL (247-183 B. C.), one of the greatest generals of antiquity, son of a Carthaginian general, Hamilcar Barca. As a child he was made to take an oath of lasting enmity towards the Romans, who had constantly sought to bring Northern Africa under subjection. At the age of twenty-two he went from Carthage to join the Carthaginian army in Spain, then commanded by his brother-in-law, Hasdrubal; three years afterwards, on the murder of Hasdrubal, he received the chief command, and prepared to march against Rome.

He set out with 90,000 foot soldiers, 12,000 horsemen and thirty-seven elephants. When he arrived, after incredible toil, at the southern foot of the Alps, his force numbered only about 26,000. However, he advanced and encountered a Roman army



CAMPAIGN IN SPAIN AND ITALY

under Scipio on the banks of the Ticino, and defeated it (218 B. C.). The next year Hannibal defeated Flaminius and then marched into Apulia, spreading terror wherever he went. In 216 a battle was fought at Cannae, which resulted in total defeat for the Romans, of whom 50,000 were killed. The Romans then shut themselves up in their walled towns, against which Hannibal's army proved ineffective. After this Hannibal made no gains, and in 203 he was recalled to defend his country, which had been invaded by Scipio. He was defeated by the Romans at Zama (202 B. C.), and the Second Punic War, after having lasted eighteen years, came to a close, and Carthage was forced to accept the most humiliating conditions of peace.

Hannibal then devoted himself, as civil magistrate, to restoring Carthage. Seven years after the battle of Zama, and in the midst of his work for a reform of administration, the jealous Romans sent ambassadors to demand his surrender. He fled to the court of Antiochus of Syria and offered his services for the war then commencing against the Romans. They were accepted, but Hannibal's advice for the conduct of the war was not followed, and he himself, as commander of the Syrian fleet, failed in an expedition against the Rhodians. Hannibal, again obliged to flee, took refuge with the king of Bithynia, and he is said to have gained several victories against the king of Pergamus, an ally of the Romans. But

the Roman Senate once more sent to demand the surrender of their inveterate enemy, and Hannibal, unable this time to escape, took poison rather than fall into the hands of his foes.

HANNIBAL, Mo., a city in Marion County, 100 miles northwest of Saint Louis, on the Mississippi River and on the Chicago, Burlington & Quincy, the Saint Louis & Hannibal, and the Wabash railroads. It has a large trade in agricultural produce and contains flour mills, foundries, car works and manufactures of stoves, clothing, cement, car wheels, shoes and rubber heels. The city has a number of good public buildings, among them being a fine city hall and a Y. M. C. A. building. The Hannibal-La Grange College is located here. There are two airports. The place was settled in 1819 and was incorporated twenty years later. It will always be remembered as the boyhood home of Mark Twain; there is a Mark Twain Museum. Population, 1930, 22,761.

HANOI, *hah'noi*, the capital and most important city of the province of Tongking, and the seat of the government of French Indo-China. It is located on the Songkoi, or Red River, on a very picturesque site, and is connected by rail with its port, Haiphong. Its wide streets, some of them lighted with electricity, and its well-built houses of brick, mud or timber make it a very attractive city. The most noteworthy building of the town is the cathedral. As a commercial center the city is important, although by far the greater part of the trade is in the hands of the Chinese. Silk, rice, embroidery and pearl work are largely exported, and there is also considerable trade in filigree work, leather articles and mats. Hanoi has belonged to France since 1882. Among its educational institutions is a school of medicine for natives. Population, 1932, 123,210.

HAN'OVER, formerly a kingdom in the northwest of Germany, later a province of Prussia. The area is 14,862 square miles. For administrative purposes it is divided into six districts, Hanover, Hildesheim, Lüneburg, Stade, Osnabrück and Aurich. The province is drained by the Elbe, Weser and Ems rivers. The Harz Mountains, in the southeast, are rich in minerals, the working of which is an important industry. The soil in the lowlands is very fertile and produces all kinds of grains, flax, hops, tobacco and potatoes. The manufactures consist of cot-

ton, woolen goods, leather and machinery, and shipbuilding is an important industry. The chief seat of learning is the University of Göttingen, founded in 1737. Hanover is the capital.

The early history of Hanover is that of Brunswick, of which it was a part. It was made an electorate in 1692. Its elector, George Louis, in 1714 became George I of England, and at this time Hanover began to grow in importance, until in 1814 it was made a kingdom by the Congress of Vienna. When Queen Victoria became queen of England, Hanover, by the Salic Law (which see), went to the nearest male heir, Ernest Augustus, Duke of Cumberland. In the war between Austria and Prussia in 1866, Hanover took the side of Austria, and the result was its annexation to Prussia by the Peace of Prague, to the utter regret of its people. Population, about 4,000,000.

HANOVER, GERMANY, capital of the Prussian province of Hanover. It is a manufacturing town of great importance, has cotton factories, machine works, iron foundries, chemical works, tobacco and cigar factories and other industries. It is also a railroad center and within a few years has become the twelfth city in size in Germany. Like other German towns, it has an old city and a new city, the latter adorned by fine monuments, public buildings and residences and noted as the seat of educational institutions of importance. Hanover was founded before 1100 and joined the Hanseatic League in 1481. It became the residence of the dukes of Brunswick-Lüneburg and capital of the principality in 1636. Population, 1933, 443,920.

HANSEATIC, *hanse at'ik*, **LEAGUE**, or **HANSA**, THE, a league formed in the thirteenth century by several cities of Northern Germany for the protection of their commerce. In the middle of the thirteenth century, the sea and land swarmed with pirates and robbers, who infested the thriving ports of the Baltic and the North Sea. A compact was made, therefore, between Hamburg and Lübeck, to keep open the road across Holstein, connecting the North Sea with the Baltic. In 1247 this league was joined by Brunswick, and out of this grew the Hansa, which at its most flourishing period included about eighty-five towns, maritime and inland. Among these the town of Lübeck was recognized as the chief, and here the deputies

of the other Hanse towns assembled to deliberate on the affairs of the confederacy.

During the fifteenth century the power of the league was at its height. It had armies and navies, gained victories in war over the kings of Norway and Denmark, and deposed a king of Sweden. It made thorough provision for the security of commerce on the Baltic and North Seas, constructed canals, introduced a uniform system of weights and measures and developed the principles of mercantile law. As its power and ambition increased it was felt to be an oppressive monopoly, established mainly in the interests of the great seaport towns. Moreover, in time it became less needful for commercial security, as princes learned the advantages of trade, formed naval forces of their own and encouraged navigation. After the discovery of America, European trade was readjusted and the Hansa declined rapidly.

HANSEN, GERHARD (1841-1912), a Norwegian physician, noted for his discoveries concerning leprosy (which see). He traveled extensively and investigated the disease wherever he found it, and he finally discovered its cause to be a bacillus. Although he was unable to discover any treatment which was effective in curing leprosy, yet by establishing the nature of the contagion he has limited its spread.

HAPSBURG, *hahps'boorK*, or **HABS-BURG**, HOUSE OF, an imperial house of Austria-Hungary, members of which ruled until the end of the World War. The name, which is a contraction of *Habichtsburg*, meaning *hawk's castle*, is taken from the castle of Hapsburg, in the canton of Aargau. This castle, it is believed, was built in the eleventh century by Bishop Werner of Strassburg, and Werner II was the first to take the title of Count of Hapsburg. Rudolf I became Holy Roman emperor in 1273, and from that time until 1806, when the title of Holy Roman Emperor was abolished, all the rulers of the Empire except two were Hapsburgs. The male line of the Austrian Hapsburgs became extinct in 1740, on the death of Charles VI, but his daughter, Maria Theresa, succeeded to the throne. She was married to Francis I of the house of Lorraine, and their descendants continued to rule until the dual monarchy was dissolved. Charles (Karl) I was the last to occupy the throne of Austria-Hungary, which he was forced to abdicate in 1918. See WORLD WAR.

HARDING, WARREN GAMALIEL (1865-1923), the twenty-ninth President of the United States. He was the seventh who was a native son of Ohio and the sixth to die while holding that high office. The story of his early life is that of many another American youth. He grew up in a small community, occupied himself with the usual pursuits of the farm and small town, rose through gradual stages, but without dramatic incident, to the editorship of a small town paper, to an interest in public affairs, which led him in sequence to the Ohio State Senate, to the lieutenant-governorship of the state, to the United States Senate in 1914, and in 1920 to the presidency.

Harding was born November 2, 1865, on a farm near Blooming Grove, Ohio, and passed his early years in this rural community. He attended high school at Caledonia, ten miles from his home, and when fourteen years old entered Ohio Central College at Iberia, from which he was graduated in 1882 with the degree of bachelor of science. For several years he was a member of the local band, and he worked for the village paper, where he learned to set type. This experience gave direction to his talent and to his future career. With the aid of his father he purchased the *Marion Star*, then in a moribund state, and began his career as an editor.

Editor and Citizen. A serious problem confronted the new editor, for along with his purpose to improve the paper and to give it character, was the necessity that it should prove a paying investment.

On July 8, 1891, he married Florence Kling, daughter of one of Marion's leading citizens; together they worked out the problems of the newspaper, until in time it became a valuable property, and influential in the state. Naturally inclined to an interest in community life, and of strong social instincts, Harding gradually entered public life. In 1900 he was elected to the state senate, where he remained four years; in 1904 he was elected lieutenant-governor; and in the next few years he was active in his party councils, and especially in the national Republican conventions, to which he was a delegate, where his character and influence were manifested and added to his reputation as a national figure. In 1914 he was elected to the United States Senate, one of the first to be elected by direct

vote of the people, by a majority of over 100,000 over his Democratic opponent. In the Senate his ability was soon recognized and he was honored with membership on the Foreign Affairs Committee.

Harding was one of the leading candidates for the presidential nomination at the National Convention of the Republican Party in Chicago in 1920. Although other strong candidates were actively supported in the Convention, Harding received the nomination on the tenth ballot. In the campaign that followed he announced his opposition to the ratification of the Treaty of Versailles and in favor of a separate peace with Germany. This was a paramount issue, and on it he was elected by an overwhelming majority, over James M. Cox, the opposing Democratic candidate, also from Ohio.

In President Harding's Cabinet were several men who had already won great and deserved reputations for ability and leadership, and some who won fame in their new posts. Among these were Charles Evans Hughes, Secretary of State, Herbert C. Hoover, Secretary of Commerce, Andrew W. Mellon, Secretary of the Treasury, and John W. Weeks, Secretary of War.

As President. During the brief administration of President Harding several measures of importance were passed by the Congress, many of which being the result of the initiative of Harding and his Cabinet. Unfortunately, some of his appointees to high places in the government proved unfaithful to their trust, and had to be removed during the Coolidge régime. The reputation of the Harding administration was clouded by these scandals.

The Limitation of Arms Conference. In the summer of 1921, Senator Borah introduced into the Congress of the United States a resolution asking the President to call a conference of the three leading naval powers to consider the question of disarmament. President Harding not only acted on this suggestion, but he went even further by including with the disarmament question a co-ordinate conference for the discussion of Pacific and far Eastern questions. The nations interested sent their strongest men to the conference, which was called to meet at Washington on November 11, 1921.

The results of this Conference were remarkable and far-reaching. They included:

(1) A fifteen-year naval holiday, with estimated savings of \$15,000,000,000; (2) an agreement insuring peace in the Pacific; (3) termination of the Anglo-Japanese Alliance, other agreements rendering this unnecessary; (4) close and friendly co-operation between the United States and Great Britain in safeguarding peace; (5) solution of the Shantung problem; (6) a promise by Japan to withdraw some of its demands on China; (7) publication of all secret treaties between China and other powers; (8) agreements to prohibit the use of chemical warfare and to outlaw piracy by submarines.

The Budget System. For years there had been a popular demand for a more business-like administration of government affairs. In 1921 Congress passed a Budget Law, and the President appointed General Charles G. Dawes as the first Director of the Bureau of the Budget to make this law effective. The results have been enormously beneficial. The expenditures of the departments are now scientifically considered in relation to receipts, and great economies and savings have been ensured.

Treaties of Peace with Germany and Austria were consummated direct with those governments and were ratified by the Senate.

A Treaty with Colombia, settling the long-standing dispute with that country, was finally signed and ratified. By this treaty, the United States made a large payment to Colombia, which agreed to respect the independence of Panama.

Refunding the National Debt. The vast national debt incurred during the World War, at high rates of interest, was largely refunded at lower rates, bringing a large saving to taxpayers.

Handling of Strike Situations. President Harding's tactful offices and skill as an arbitrator prevented a strike of coal miners and of railroad workers.

Tariff Revision. The new law provided for flexibility in schedules, and a more scientific administration of the tariff principle.

Veto of Soldiers' Bonus Bill. Although this was a popular measure, and the President's sympathy was fully given to the ex-service men, he believed that economic considerations were opposed to such legislation at the time.

President Harding was a strong advocate of the policy of America's entrance into the

World Court, at the same time adhering to the opinion that the nation should not become a member of the League of Nations. He had become convinced that wars commonly result from the exaggeration and aggravation of comparatively minor differences among nations which in most cases could be removed if they were dealt with in the right time and in the right spirit.

His Last Days. The tour of the country which President Harding made in the summer of 1923 was planned and undertaken with a two-fold purpose, to get in personal touch with the people throughout the western sections of the country, including Alaska, so as to get at first hand their sentiments on the great questions of the day, and to lay before that public some of the thoughts and plans that had developed in his mind after two years in office, looking to the betterment of the country in its domestic concerns, to relieve the burden of taxation, to aid the agricultural interests, to carry on the broad program of conservation of national resources which had been begun by his predecessors. So great progress had been made in the two years of his administration in the interests of peaceful relations with other nations, that Harding's mind and heart were set on extending so far as possible those agencies that would insure peace. Among his last acts was the release from his sick-bed in San Francisco of his so-called "World Court" speech, which he had prepared in strong advocacy of the United States giving adherence to the World Court program.

The strain under which Harding suffered during the latter part of his trip was very great. He was attacked by ptomaine poisoning in Alaska, and was very ill on the return trip to San Francisco. He endured two days of public receptions and speechmaking at Seattle, reviewed the fleet in Puget Sound, and arrived in San Francisco much enfeebled. Taken at once to a hotel, he was placed in the care of physicians. It was seen at once that plans for his California tour would have to be cancelled. But he determined that it was his duty to present to the public the address he had prepared with so much thought and care. This proved to be his farewell address, and as such it will stand among the impressive memorials of his work and aims.

His Death and Funeral. Early bulletins issued by the President's physicians gave

hope to the country that he would recover. The shock was great therefore when the announcement came that the President had died suddenly on the night of August 2, of a stroke of apoplexy. Mrs. Harding was with him at the end.

President Harding's death profoundly affected the entire nation. His genial personality had endeared him to the people, even to his political opponents, and it came as a shock to the nation to learn after his death of the graft and mismanagement in some of the great departments of government during his administration. By many his illness and death were induced by a growing consciousness of impending scandal, not then disclosed.

The funeral train, bearing the body of the late President, was greeted by vast throngs on its long journey to Washington. The body was borne to the East Room of the White House.

The funeral services were held in Washington on August 8. From the White House the body was borne in stately procession to the rotunda of the Capitol, escorted by distinguished men, troops under arms and civilian organizations. After the religious ceremonies at the Capitol, the body was taken to the train to be conveyed to the late President's home town, Marion, Ohio, for burial. On the day of the funeral there was a general cessation of business, industry, sports and amusements throughout the nation. At the moment of burial all activities ceased for several minutes, taps were sounded and bells tolled throughout the country.

Vice-President Coolidge took the oath of office before his father, a notary public, at Plymouth, Vt., on the day following the President's death, and by this simple ceremony the presidency of the United States passed from Warren Gamaliel Harding to Calvin Coolidge.

Administration of Warren G. Harding 1921-1923

I. THE PRESIDENT

Early Life
Education
Editor
Public Life
Character

II. DOMESTIC AFFAIRS

Tariff revision
Relief for sick and disabled soldiers
Financial aid to agriculture
The Budget System inaugurated
Immigration restriction
Refunding of the public debt

III. FOREIGN AFFAIRS

Treaty of Peace with Germany
Treaty of Peace with Austria
Treaty with Colombia, settling long-disputed claims
Limitation of Arms Conference, resulting in:
(1) A fifteen-year naval holiday
(2) Agreement, insuring peace in the Pacific
(3) Termination of the Anglo-Japanese Alliance
(4) Friendly co-operation between the United States and Great Britain in safeguarding peace

(5) Solution of the Shantung problem

(6) Promise by Japan to withdraw some of its demands on China

(7) Publication of all secret treaties between China and other powers

(8) Agreement to prohibit the use of chemical warfare and to outlaw piracy by submarines

Questions

What were circumstances of Harding's boyhood and early life?

What directed his efforts toward journalism?

Name the offices which he filled in his native state.

Who were the prominent members of his Cabinet?

What was the reason for enacting the Budget Law?

Why did the government refund the public debt?

Who succeeded Harding as President, and under what circumstances?

Name the Presidents who were born in Ohio.

Name the Presidents who died in office.

HARDING'S ADMINISTRATION

1921

1923



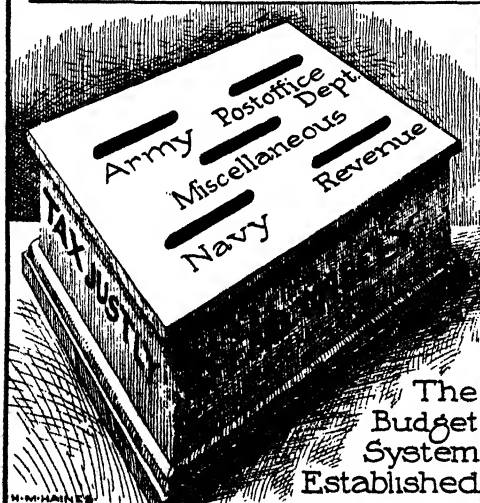
Bonus Bill for
Soldiers Vetoed

Warren G. Harding

Treaty of Peace with
Germany, Oct. 1921

IMPORTANT EVENTS

Born, Morrow County, Ohio, November 2, 1865
Became owner and editor of Marion Star
Elected to Ohio State Senate, 1900
Elected to United States Senate, 1914
Elected President of the United States, 1921
Limitation of Arms Conference, November 1921
Established the Budget System
Treaties with Germany and Colombia
Died, San Francisco, August 2, 1923



HARA-KIRI, *hah'rah ké're*, or **SEP-PUKU**, *sep poo'ku*, a form of suicide allowed in old Japan among the nobles and Samurai. When unwilling to survive disgrace, or when condemned for crime, the unfortunate person availed himself of the privilege, preferring death to dishonor, in the former case, and in the latter, choosing to die by his own hand rather than by public execution. Hara-kiri consists in making two deep cuts in the abdomen in the form of a cross. With the decay of feudalism hara-kiri is now rarely practiced. But it survives as a form of voluntary suicide, the main motives for voluntary hara-kiri being loyalty to a dead superior, avoidance of dishonor in battle, or protest against an offensive national policy. The latest conspicuous instance occurred in 1912, when general Nogi and his wife both committed hara-kiri because they did not wish to outlive their beloved emperor Mutsubito.

HARCOURT, RICHARD (1849-), a Canadian lawyer and statesman. He was born in Toronto, and was educated at its university. He was a member of the Ontario Legislature from 1878 to 1908; treasurer of the Province, 1888 to 1898 and minister of Education, 1898 to 1905. His home is at Welland, Ontario.

HARCOURT, SIR WILLIAM GEORGE GRANVILLE VENABLES VERNON (1829-1904), an English statesman. He was born at Oxford, and was graduated with honors from Trinity College, Cambridge, in 1857. In 1868 he entered Parliament as a Liberal from Oxford, and in 1869 he became professor of international law at Cambridge, retiring in 1873 to take the post of solicitor-general under Gladstone. In the same year he was knighted and in Gladstone's second administration he was made home secretary. He was a vigorous advocate of Gladstone's Irish Home Rule measures. From 1895 until his death he was a member of the House of Commons. In 1886 he was made Chancellor of the Exchequer, and later in 1892-1895. From 1895 to 1898 he was leader of the Liberals in the House of Commons. He was an able speaker and debater, and had a deep knowledge of public affairs, especially of finance.

HARDECANUTE, or **HARTHACNUT** (about 1019-1042), king of England and Denmark, the son of Canute. At the time of his father's death in 1035 he was in Den-

mark, where he was immediately recognized as king. His half-brother Harold, however, who happened to be in England at the time, laid claim to part of their father's dominions and succeeded in getting possession of Mercia, Northumbria and Wessex. He died in 1040, and Hardecanute peacefully succeeded him. He reigned until his death, but the government was in the hands of his mother and the powerful Earl Godwin.

HARDNESS. If two hard substances are rubbed together the one which will indent or scratch the other is the harder. Glass will scratch gold, therefore it is harder than gold. The degree of hardness of most metals is changed by heating and then cooling. If iron and steel are heated and then cooled quickly they become harder; if cooled slowly they become softer.

Talc and gypsum can be scratched by the finger nail; in ascending degrees of hardness are calcite, fluor spar, apatite, feldspar, quartz, topaz, sapphire, diamond.

HARDY, *hahr'dy*, THOMAS (1840-1928), an English novelist and poet, called the last of the great Victorians. He was born in a small village near Dorchester, in the county of Dorset, the region that figures in many of his novels as "Wessex." Educated for the profession of ecclesiastical architecture, Hardy combined this work with writing for several years, but after 1868 he devoted himself to literature. *Under the Greenwood Tree* (1872) and *Far from the Madding Crowd* (1874) are the best known of his earlier novels. Then followed *The Return of the Native*, *The Woodlanders*, *Tess of the D'Urbervilles*, *Jude the Obscure* and *Life's Little Ironies*, the last a volume of short stories. Hardy's fatalistic attitude and his merciless realism give his novels a somber tone but they are fascinating reading and deeply moving. In later years he turned to poetry, his finest achievement in this field being *The Dynasts* (1904-1908), an epic poem in dramatic form. Lyrical poetry of high merit came from his pen after 1909. His last volume, *Winter Words*, was published after his death.

HARE, the common name of an animal related to the rabbit. It may readily be recognized by its long ears, long hind limbs, by which it moves in long leaps, its short tail and its soft hair. The hare is distinguished from the rabbit by the fact that the former does not burrow, but builds nests in the

ground, where the young are born. The hare, too, is the larger, and is more fleet than the rabbit. The common hare is found throughout Europe and in some parts of Asia. It is tawny red or brown on the back and white on the belly and is about two feet long. The *mountain hare*, or *varying hare*, confined to Northern Europe and the mountainous regions of the South, is smaller than the common hare and becomes white in winter.

The *American hare*, not much larger than a rabbit, is found in most parts of North America. In North America there are also the *polar hare*, a variety of the varying hare, but of superior size and purer color, and the *prairie hare*, known as the *jack-rabbit*, from its size and length of limb. The Belgian hare is really a rabbit. Though hares have no courage and little cunning, they are protected from their enemies by sharp sight and hearing and extraordinary fleetness. A hare's voice is never heard except when the animal is seized or wounded. It then utters a sharp, loud cry, not very unlike that of a child. Its flesh is rather dry, but it is much prized because of its peculiar flavor. The young are not helpless at birth, like baby rabbits, but are able to care for themselves after a month or two.

HAREBELL, the Scotch blue-bell, a plant from four to six inches high, having slender stems each bearing one or more bell-shaped, blue flowers and scant foliage. Occasionally the flowers are white. The harebell is common on dry and rocky soil in many parts of Europe and America.

HA'REM, a term used by Mohammedans to signify the women's apartments in a household, forbidden to every man except the husband and near relations. The word is also applied to the women themselves. The women of the harem may consist simply of a wife and her attendants, or there may be several wives and an indefinite number of

concubines, or female slaves. One of the greatest harems was that of the sultan of Turkey. The women of the imperial harem were all slaves, generally Circassians or Georgians, from Russia. In the harem the women were supreme. There they received their friends, walked about in the gardens, indulged in dressing and feasting, employed themselves in needlework, and enjoyed the dancing of the slaves. The women of other Turks enjoyed the society of their friends at the baths or in each other's houses and appeared in public, accompanied by slaves and eunuchs, but the women of the sultan's harem had none of these privileges.

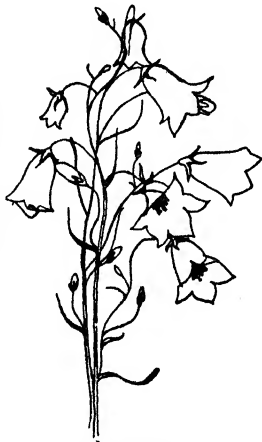
The abolition of polygamy in Turkey in 1925 and the greater personal freedom granted to women have resulted in a great change in the social life of the Turkish people. The harem still exists in other Mohammedan countries, but as an institution it has lost its former mystery.

HARGREAVES, *hahr'greevz*, JAMES (1720-1778), an English inventor. In 1760 he devised a machine for carding cotton, and some years afterward produced the spinning jenny, by which he was able to spin with several spindles at once. Believing that his employment of machinery would destroy labor, his neighbors broke into his dwelling and destroyed his machine. Manufacturers stole his designs, and he was unable to secure patents upon them, so that he never profited much by his inventions, though they, with the power loom, invented by Cartwright, revolutionized the cotton industry.

HARLAN, *hahr'lan*, JOHN MARSHALL (1833-1911), an American jurist, born in Boyle County, Ky. He was graduated from Center College in 1850, studied law at Transylvania University, began practice in 1853 and became county judge in 1858. He took part in the Civil War as a Union soldier, and from 1863 to 1867 was attorney-general of Kentucky. In 1877 President Hayes appointed him Associate Justice of the Supreme Court, where he served with distinction for thirty-four years. He was one of the commissioners in the Bering Sea arbitration in 1893.

HARLAND, MARION. See TERHUNE, MARY VIRGINIA.

HARLEQUIN, *hahr'le kwin*, a general name for a comic rôle in pantomime. On the Italian stage Harlequin is a comic character, full of drolleries, tricks and knaveries,



HAREBELL

and somewhat resembles the English clown. The Harlequin of British pantomimes is somewhat different. He is the lover of Columbine and possesses a wonderful working wand, with which he protects her against Clown and Pantaloon, who pursue and endeavor to capture her, until the pursuit is brought to a termination by a good fairy. Harlequin usually wears tights of bright colors and glittering spangles. In common usage the term has come to be almost interchangeable with clown.

HARMONICA, a musical instrument consisting of a series of glass cups, invented by Benjamin Franklin. The cups, shaped like half globes, were tuned by putting varying quantities of water into them. A simple mechanism kept them revolving during a performance and the tones were produced by touching the glass-rims with the finger-tips. The name is sometimes applied to the mouth-organ, or jewsharp.

HARMONICS, *har mon'iks*, the accessory sounds accompanying the predominant and apparently simple musical tone produced by a string, pipe or other sonorous body. No purely simple tone is producible. When a string is struck the whole string vibrates as a unit, giving rise to a strong tone called the *fundamental*. However, several other tones, much weaker than the fundamental, are simultaneously produced, owing to the varying lengths of the vibrations along the entire length of the string. These secondary tones are called *harmonics*.

The first harmonic of the fundamental note of any string is that produced by half the string and is the octave of the fundamental; the second harmonic is given by each third of the string and is the fifth, or dominant, of the fundamental note, and so on, the complete series of harmonics containing all the notes of the musical scale. But while harmonics enter into the composition of every musical sound, different vibrating bodies suppress some and emphasize others, thus producing different qualities of tone. See **MUSIC**; **SOUND**.

HARMONY, that part of the science of music which treats of cords, their structure and relation. It is the fundamental branch of musical composition, and its importance can readily be seen from the fact that any simple melody can be made to arouse widely different emotions when given different harmonic settings. Although a crude experi-

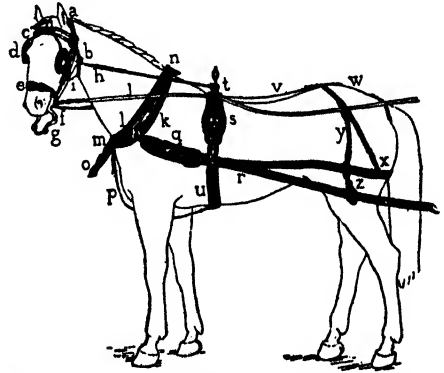
ment in harmony was made in the tenth century, not until the eighteenth century did the science revolutionize musical composition. By means of it the simplest melody can be transformed into a powerful and soul-stirring work of art.

The same term is used to denote the concord of two or more strains or sounds, differing in pitch or quality, as distinguished from melody, which consists of a pleasing series of single tones. See **MUSIC**; **CHORD**; **COUNTERPOINT**.

HARMONY OF THE SPHERES, a supposition of Pythagoras and his school, that the motions of the heavenly bodies produced a music which could not be heard by men. He supposed these motions to conform to certain fixed laws, which could be expressed in numbers corresponding to the numbers which give the harmony of sounds.

HARMSWORTH, ALFRED CHARLES WILLIAM. See **NORTHCLIFFE**, **LORD**.

HARNESS, a tackle or working gear of a horse, mule or other draft animal, except the ox. Harness is usually made of leather, but in some countries it is made of leather and cords combined. Harness used with driving carriages is often highly ornamented with brass, silver or gold plate. The parts of the harness are shown in the illustration. The blinds, however, are now frequently omitted.



a, crown; b, checkpiece; c, front; d, blind; e, noseband; f, bit; g, curb; h, check; i, throatlatch; j, rein; k, collar; l, hame; m, hame-link; n, hame-strap; o, pole-strap; p, martingale; q, trace-tug; r, trace; s, saddle; t, terret; u, bellyband; v, turnback; w, crupper; x, breeching; y, hipstrap; z, trace-bearer.

HAR'OLD, or **HAR'ALD I** (about 850-933), a king of Norway. His father Halfdan was one of the numerous jarls, or petty kings, among whom Norway was divided.

On succeeding his father Harold overthrew and drove from the country all the other jarls and made himself sole ruler of Norway. Among the conquered jarls was Rolf, who emigrated to France, where he obtained a grant of land and established himself as first duke of Normandy. Harold also partially freed Norway from the pirates and brigands who had long disturbed the country.

HAROLD, or **HARALD III**, surnamed *Haardraade*, meaning *hard ruler* (1015-1066), king of Norway. He spent a number of years in Constantinople, as a member of the emperor's bodyguard, and had many adventures in Sicily and at Jerusalem. In 1046 he returned to Norway and was made by the king, his nephew, joint ruler. Two years later, on the death of the king, he became sole ruler. He took part with Tostig, brother of Harold II of England, in his attempt to wrest the crown of England from Harold II, and was killed in the Battle at Stamford Bridge.

HAROLD I, surnamed *Harefoot*, was a son of Canute, king of England, Denmark and Norway. On the death of Canute, in 1035, both Harold and his brother Hardecnut claimed the throne. Civil war was averted by dividing the kingdom. However, as Hardecnut remained in Denmark, the people, dissatisfied, crowned Harold sole king of England in 1037. Harold died in 1040.

HAROLD II, (1022?-1066), the last Anglo-Saxon king of England. On the death of his father, Earl Godwin, he became Earl of Wessex and head of the national party, which was trying to weaken Norman influence at the court of Edward the Confessor. On Edward's death in 1066 the nobles elected Harold king.

William of Normandy asserted that Harold had taken oath to support his claims to the throne; and to avenge himself on Harold and gain possession of the crown, he invaded England in October, 1066, and met Harold at Senlac, near Hastings (see **HASTINGS**, **BATTLE OF**; **WILLIAM I, THE CONQUEROR**). Harold was killed in the battle.

HARP, a stringed instrument which originated in very ancient times. The modern instrument is nearly triangular in form and stands upright upon one of its angles, which is supported by a base. Forty-six strings are stretched parallel with the perpendicular column. The performer sits on the opposite side of this column and faces it, tilting the in-

strument toward him and striking or pulling the strings with thumbs and fingers. The modern harp has double action. Around the base of the instrument are seven pedals, each of which controls one note of the scale. When the pedal for any key is depressed one notch, the corresponding strings are raised one half tone in pitch; when a pedal is depressed to the second notch, the pitch is raised another half tone. The harp is tuned normally to C flat major, and is the only stringed instrument on which the intervals between sharps and flats can be played.

HARPER, **WILLIAM RAINY** (1856-1906), an American educator, for fifteen years president of the University of Chicago. He organized the institution. He was born at New Concord, Ohio, and was educated at Muskingum College, and at Yale. Afterwards he became professor of Hebrew at the Baptist Union Theological Seminary in Chicago, and in 1886 was elected professor of Semitic languages in Yale University. Later he was principal of the Chautauqua College of Liberal Arts and director of the Chautauqua system, where his talents as an administrator added to his reputation.

In 1891 Professor Harper became president of the University of Chicago. Under his administration this institution became one of the world's great centers of research and advanced learning (see **CHICAGO**, **UNIVERSITY OF**). Dr. Harper had a world-wide reputation as a student of Hebrew and other Oriental languages, and was the author of *The Elements of Hebrew*, *Elements of Hebrew Syntax* and a number of other similar works. He was also editor of the *American Journal of Theology* and the *American Journal of Semitic Languages and Literature*, both published at the University of Chicago.

HARPER'S FERRY, **W. VA.**, a town in Jefferson County, on the Baltimore & Ohio railroad, fifty miles northwest of Washington, D. C. Harper's Ferry had an interesting history in the Civil War. It was the scene of the famous raid of John Brown, Oct. 16, 1859 (see **BROWN**, **JOHN**). At the outbreak of the war it was abandoned by a small Union garrison and was occupied by Confederates, first under Colonel ("Stonewall") Jackson and afterward under Gen. Joseph E. Johnston. It was evacuated June 15, 1862, and later occupied by a Union force, which in turn was captured by Jackson, Sep-

tember 15, during Lee's first invasion of the North. Population, 1930, 705.

HARPIES, the ancient Greek goddesses of storms. Their parentage, ages, appearance, names and number are very differently given by the poets. In the Homeric poems they are merely storm winds. Hesiod represents them as two young virgins of great beauty, called Aëlle and Ocypete, but the later poets and artists vied with one another in depicting them under the most hideous forms, covered with filth and polluting everything in contact with them.

HARPOON', a sort of spear used in killing whales and other large fish. The head has a sharp, wedge-shaped point, with barbs, and is usually of the same piece as the handle, which is about three feet in length. The harpoon is fastened to a long rope, that is coiled in the boat. When the boat approaches near the whale, the harpoon is thrust into his body. The rope can be paid out or taken up, as the safety of the boat requires. The bomb lance, which is a hollow harpoon containing a shell filled with explosive, is now used in catching whales. The lance is shot from a gun, and when it enters the body of the whale the bomb explodes and kills him instantly. These harpoons sometimes weigh as much as 100 pounds.

HARPSICHORD, a keyed instrument resembling the modern grand piano, of which it was the forerunner. Its action was mechanical, the strings being set in vibration by quills firmly attached to wooden uprights called "jacks." These quills were operated by pressure on the keys. The harpsichord was popular from the sixteenth to the eighteenth century, but is seen to-day only in museums or private collections.

HARPY, a large and very powerful eagle of the tropics, that sometimes strays as far north as the Southern United States. It is larger than the golden eagle, being forty-two inches in length, but has a somewhat shorter expanse of wing. Its bill is crooked; its claws are extremely strong and sharp, and the muscles of its shoulders are exceedingly powerful. The harpy is dark gray, barred with black above and white below, except for a dark band across its breast. Its head bears a handsome crest. It will defend itself even against man, when wounded, but in spite of the numerous stories told of its marvelous fierceness and strength, it is doubtful if it ever attacks man of its own accord.

HAR'RADEN, BEATRICE (1864—), an English novelist, born at Hampstead, whose first novel, *Ships that Pass in the Night*, made her famous on its publication in 1893. She is a well-educated woman, having taken a degree at the University of London at the age of twenty-one. In 1894 and 1895 she traveled in the United States and lived for some time on a California ranch. Among later books are *In Varying Moods*, *The Fowler*, *Hilda Strafford*, *Out of the Wreck I Rise*, and *Where Your Heart Is* (1918).

HAR'RIER, See MARSH HAWK.

HARRIMAN, EDWARD HENRY (1848–1909), an American capitalist and railway owner, born at Hempstead, Long Island, the son of an Episcopal clergyman. At fourteen years of age he left school and entered a broker's office in New York. At twenty-two he became a member of the Stock Exchange and continued in the brokerage business until, in 1887, he was elected vice-president of the Illinois Central Railroad. His greatest work was the reorganization and rebuilding of the Union Pacific Railroad and this was followed by the acquirement of the Southern Pacific and its western connections. Besides the roads mentioned, the Illinois Central, Chicago & Alton, Baltimore & Ohio, Pennsylvania and others became closely allied with the Harriman system. His country estate at Arden, N. Y., contains 26,000 acres, largely woodland. He built a great clubhouse on the East Side for poor boys.

HARRIS, JOEL CHANDLER (1848–1908), an American author, popularly known as "Uncle Remus," was born in Eatonton, Ga. He served an apprenticeship to the printer's trade, then studied law and finally settled down to journalism. In 1876 began his connection with the *Atlanta Constitution*, which lasted for twenty-five years; and for this paper he wrote the first of those negro dialect fables which were afterward published as *Uncle Remus: His Songs and Sayings* (1880). These sketches received such a warm welcome that *Nights with Uncle Remus* and *Uncle Remus and His Friends* soon followed. The hero of these stories is "Brer Rabbit." Harris was one of the most popular Southern writers of fiction. His stories form a valuable contribution to American literature, by reason of their intimate, faithful pictures of Southern life and their accurate reproductions of negro dialect. His best works, besides those mentioned above, are *Daddy Jake*,

the Runaway; Sister Jane; Stories of Georgia; Free Joe; Aaron in the Wildwoods; Tales of the Home Folks; Balaam and His Master, and A History of Georgia.

HARRIS, WILLIAM TORREY (1835-1909), a distinguished American educator, the second and most notable United States Commissioner of Education, was born at Killingly, Conn., and educated at Yale University. He began teaching in Saint Louis, Mo., and became superintendent of the Saint Louis schools in 1867. The same year he founded *The Journal of Speculative Philosophy*, which he long continued to edit. This was the first journal of the kind in the English language.



WILLIAM T. HARRIS

While superintendent of the Saint Louis schools, Doctor Harris became widely known through his reports, which showed remarkable insight into educational problems, and these were sought by educators at home and abroad. He was elected president of the National Educational Association in 1875 and represented the United States at the International Congress of Educators, which met at Brussels in 1880. In 1889 he prepared the official *Statement of the System of Education of the United States*, for the Paris and Vienna expositions. In the same year he was appointed United States Commissioner of Education, which position he held until June, 1906, winning wide fame by his masterly and helpful administration of the office.

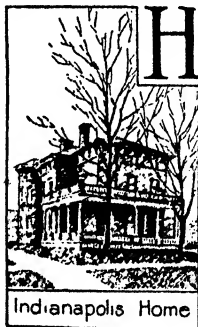
HARRISBURG, PA., the capital of the state and the county seat of Dauphin County, 105 miles west by north of Philadelphia, on the Susquehanna River, and on the lines of the Reading and the Pennsylvania railroads. There are two airports. The city is picturesquely situated along the river, which is here a mile wide and spanned by fine bridges. The most prominent building is the state capitol, costing more than \$4,000,000; the frontage is 520 feet 8 inches. There are a large public library, a state library, a conservatory of music, and various hospitals and

charitable organizations. Other prominent buildings are the governor's mansion, a state arsenal, a state hospital for the insane, a county prison, and a Y. M. C. A.

The city has excellent transportation facilities and conducts a large trade in lumber and other goods. The iron and coal mines close at hand have led to the development of a great variety of factories in the iron and steel industry. Shops of the Pennsylvania Railroad are here. Harrisburg has factories of much importance for making needlework products, and it also produces foods; it has a large silk mill.

In 1726 the English trader John Harris settled there. A ferry was established later, and the place was known as Harris's Ferry, until a town was laid out in 1785 and called Harrisburg. In 1812 it was made the capital of the state, and it was chartered as a city in 1860. Population, 1920, 75,917; in 1930, 80,339, a gain of 5.8 per cent.

HARRISON, BENJAMIN (about 1740-1791), an American Revolutionary patriot and signer of the Declaration of Independence, was born at Berkeley, Va. He was one of the conservative patriots and opposed Patrick Henry's early resolutions against the Stamp Act, but later he represented Virginia in the Continental Congress and rendered important service as president of the Board of war. Returning to his state, he was speaker of the house of burgesses from 1777 to 1782, and for three years thereafter he was governor. He opposed the ratification of the Federal Constitution by Virginia.



HARRISON, BENJAMIN (1833-1901), an American statesman, the twenty-third President of the United States. He was the grandson of William Henry Harrison, ninth President of the United States, and the great-grandson of Benjamin Harrison, a signer of the Declaration of Independence. Harrison is remembered as a President who was thoroughly honest and courageous in expressing his convictions, without being in any sense a great popular leader. He was born at North Bend, Ohio, August 20, 1833, and during his boyhood went to school in a log building and worked on the farm of his distinguished

Administration of Benjamin Harrison, 1889-1893

I. THE PRESIDENT

- (1) Ancestry
- (2) Birth
- (3) Education
- (4) Military career
- (5) Public life
- (6) Character
- (7) Death

II. GOVERNMENTAL AFFAIRS

- (1) Domestic
 - (a) Sherman Silver Purchase Act
 - (b) McKinley Tariff Act
 - (c) Sherman Anti-Trust Law
 - (d) Renewal of the Chinese Exclusion Act
 - (e) Reduction of the surplus
 - (1) By increasing pension list
 - (2) Repayment of direct Civil War taxes to the states
 - (3) Appropriations for unnecessary internal improvements
 - (4) Rapid construction of battleships
 - (f) Dictatorship of the Speaker of the House of Representatives
 - (g) Admission of new states
- (2) Foreign relations
 - (a) Bering Sea Decision
 - (b) Principle of Reciprocity
 - (1) Treaty with Spain
 - (2) Treaty with Brazil
 - (c) Act of Berlin, regarding Samoa
 - (d) Pan-American Congress
 - (e) International copyright law, 1891
 - (f) Panama scandal
 - (1) Revolution and anarchy on the Isthmus
 - (2) United States sent troops
 - (g) Proposed annexation of Hawaii

III. LOCAL AND INTERNAL AFFAIRS

- (1) Adoption of the Australian

ballot system

- (2) Admission of Oklahoma to settlement
- (3) Johnstown Flood
- (4) University of Chicago and Leland Stanford Junior University founded
- (5) Farmers' Alliance
 - (a) Originally a farmers' organization
 - (b) Later a political party
- (1) Platform
 - (a) Abolition of National banks
 - (b) More paper money
 - (c) Against dealing in futures of agricultural and mechanical products
 - (d) Free and unlimited coinage of silver
 - (e) Government ownership of all means of transportation and communication
- (2) Controlled some of the western states
- (3) Merged in the Populist party, 1892
- (6) Homestead Riots
- (7) Election of 1892

Questions

Who was Benjamin Harrison's grandfather? Great-grandfather?

Give a brief account of his early life.

What law was superseded by the Sherman Silver Purchase Act?

What did the new law require the Secretary of the Treasury to do?

What was the character of the McKinley Tariff Act?


What new states were admitted?

What was the cause of the Bering Sea controversy? How was it settled?

What were the objects of the Sherman Anti-Trust Law?

HARRISON'S 1889

SOME OF THE MORE IMPORTANT EVENTS
- 1889 -

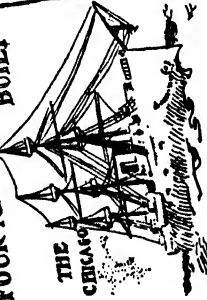
 THE FIRST EXECUTION BY ELECTRICITY.
THE 11TH CENSUS
POP. - 62,623,250 -

THE PAN-AMERICAN CONGRESS.

IDAHO AND WYOMING ADMITTED AS STATES



THE TOWN FLOOD
FOUR NEW WAR SHIPS BUILT



THE CHICAGO

THE FIRST EXECUTION BY ELECTRICITY.
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THE PAN-AMERICAN CONGRESS.

IDAHO AND WYOMING ADMITTED AS STATES




THE SHERMAN SILVER PURCHASE ACT.

THE MORMONS CEASE TO TEACH AND PRACTICE POLYGAMY.

THE DEATH OF JOHN C. FREMONT

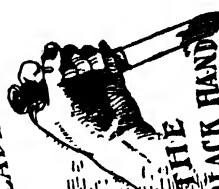
ADMINISTRATION 1893

OF PRESIDENT HARRISON'S ADMINISTRATION
- 1892 -


 CHICAGO AND LE-
LAND STANFORD
UNIVERSITIES FOUND-

ED. THE EHRING
SEA TREATY.

OPENING OF DREX-
EL INSTITUTE IN
PHILADELPHIA.



THE BLACK HAND
IN NEW ORLEANS
TROUBLE WITH THE
"MAFIA!"

 HE HOMESTEAD LA-
BOR TROUBLES

THE CHINESE EX-
CLUSION
BILL RE-
ENACTED.



THE PANAMA
SCANDAL.

THE UNITED
STATES AID FAM-
INE STRICKEN
RUSSIA.

THE FARMERS
ALLIANCE MOVE-
MENT.

grandfather. His early education was supplemented by lessons from a tutor and a course at an academy near Cincinnati, and in 1852 he was graduated from Miami University. After his graduation he studied law in Cincinnati, and two years later removed to Indianapolis, where he built up a large law practice.

When the Civil War broke out, Harrison entered the Union army as lieutenant, but was soon promoted to colonel and organized the Seventeenth Indiana Volunteers. He fought bravely in the Atlanta campaign and about Nashville, and at the close of the war had won the rank of brigadier-general. On his return to civilian life he became supreme-court reporter, but in 1868 resumed the practice of law. In 1876 he was nominated by the Republican party for governor of Indiana, but was defeated. Four years later he was elected United States Senator, serving one term, and in the Senate was a conspicuous advocate of civil service reform and of restriction of Chinese immigration.

Harrison received the Republican nomination for President in 1888, and in the campaign the tariff was the outstanding issue. The Republican nominee made a number of speeches to visiting delegations at his own home, carrying on an effective "front-porch" campaign. Grover Cleveland, the Democratic nominee, sought reelection on a platform calling for a correction of the evils of the high tariff. The outcome was not a conclusive verdict of the people themselves, for Harrison won in the electoral college by a vote of 233 to 168, while Cleveland had a popular plurality of about 100,000. Harrison is therefore one of the few minority Presidents in American political history. During the first session of Congress there were passed three important measures favored by the Republicans—the Sherman Silver Purchase Act, the McKinley Tariff Act and the Sherman Anti-Trust Act. Another domestic event of great importance was the admission into the Union of six states—the two Dakotas, Montana, Washington, Idaho and Wyoming. In 1889 Oklahoma, then a part of Indian Territory, was opened to white settlement, and in a single day 50,000 new settlers pitched camps on its fertile acres.

In the realm of foreign affairs many events of interest took place. James G. Blaine, Harrison's Secretary of State, was the guiding spirit of the first Pan-American Congress,

held at Washington in 1889, and the United States entered into reciprocity treaties with Spain and Brazil. In 1892 a law restricting Chinese immigration was passed. Difficulties with Great Britain over the rights of American and British fishermen in the Bering Sea were settled peaceably by arbitration, and war with Italy over the lynching of eleven Italians in New Orleans was averted by the payment of an indemnity to the families of the victims. The tariff issue loomed large in the campaign of 1892, however, and on that issue the Republican and Democratic candidates staked their political fortunes. Harrison lost the election to his opponent, Grover Cleveland, and the Democrats also secured control of Congress.

Harrison was much in the public eye even after his retirement from office. He delivered a series of lectures at Leland Stanford Junior University, wrote for magazines, and was the counsel for Venezuela before the commission which settled the boundary dispute between that country and Great Britain. In 1899 he represented the United States at the Hague Peace Conference. He also resumed his law practice, and found time, meanwhile, to write *This Country of Ours*, a practical study of the way the United States government functions. This busy ex-President died at his home in Indianapolis on March 31, 1909, after an illness of a few days.

Related Articles. Consult the following titles for additional information:

United States, p. 3713	Pan-American Congress
Tariff	

HARRISON, FRANCIS BURTON (1873-), governor-general of the Philippine Islands by appointment of President Wilson in 1913. He was born in New York City, became a lawyer in 1898, entered the Spanish-American war as a private in cavalry regiment and was promoted to the rank of captain. He represented a New York district in Congress from 1903 to 1913, when he resigned to accept the Philippines appointment.

As governor, Harrison felt it to be his duty to encourage the idea of political independence of the islands, in accordance with the announced views of the Democratic party, then in power in the government. In 1919, when on a visit to the United States, the question of Philippine independence came before Congress in an informal manner. He resigned his position in 1920, and was succeeded by General Leonard Wood.



Battle of the Thames

HARRISON, WILLIAM HENRY (1773-1841), an American soldier and statesman, ninth President of the United States, and the grandfather of the twenty-third President, Benjamin Harrison. One month after his inauguration, death brought his administration to a close, and his tenure of the Presidential office was thus the briefest in American history. He was also the first President to die a natural death before the close of his term. Harrison

was born on February 9, 1773, at Berkeley, Va., of a well-known and aristocratic colonial family. His father, Benjamin Harrison, was one of the signers of the Declaration of Independence.

The boy received a good education, and at the age of seventeen was graduated from Hampden Sidney College. After his father's death, in 1791, Harrison joined the army which Wayne was leading against the Northwestern Indians, and he showed great gallantry at the battle on the Miami (1794). He represented the Northwest Territory as a delegate in Congress in 1799-1800, and succeeded in securing the passage of an important law relating to the sale of the Federal land in small parcels. When Indiana Territory was formed (1800), including the

present states of Indiana, Illinois, Michigan and Wisconsin, besides parts of Minnesota and Ohio, he was appointed its governor, holding this position until 1812. He labored courageously to win the friendship of the Indians, but was compelled to

quell Tecumseh's outbreak and to beat off a fierce and treacherous attack under Tecumseh's brother, The Prophet, ending in an im-



WILLIAM HENRY HARRISON

Administration of William Henry Harrison

I. WILLIAM HENRY HARRISON

- (1) Birth and parentage
- (2) Education
- (3) Begins a military career

II. CAREER AS A SOLDIER AND ADMINISTRATOR

- (1) Battle on the Miami
- (2) Delegate for Northwest Territory
- (3) Governor of Indiana Territory
- (4) Battle of Tippecanoe
- (5) War of 1812
- (6) Represents Ohio in Congress and state senate
- (7) Minister to Colombia

III. PRESIDENTIAL CANDIDATE

- (1) Campaign of 1836
- (2) "Log cabin and hard cider" campaign of 1840
- (3) Election and inauguration
- (4) Death

Questions on Harrison

Why can the Harrison family be called a notable one?

What was the meaning of the slogan "Tippecanoe and Tyler too"?

How long did Harrison's administration last?

What other accidental Presidents have held office?

What notable things did Harrison do before he was elected President?

How many times did he run for President?

How did he get his nickname of "Tippecanoe"?

portant battle at Tippecanoe (November 7, 1811). Harrison's bravery and good judgment in this incident won him his nickname of "Tippecanoe."

In the War of 1812 Harrison was appointed major-general of Kentucky militia, and later brigadier-general in the regular army, with chief command in the Northwest. He repulsed the British force under Proctor, and by the victory of Perry on Lake Erie he was enabled to pursue the invaders into Canada, where, on October 5, 1813, he totally

routed them in the Battle of the Thames. In 1816, having become a military hero, he was elected to Congress from Ohio, and in 1824 to the state senate. In 1828 he went as minister to Colombia, but was recalled the following year, and returned to his home in North Bend, Ohio. For twelve years he was clerk of a county court in Ohio.

Harrison was nominated for the Presidency in 1836 by Whig conventions in several states, and received seventy-three electoral votes against Van Buren's 170. He proved to be the most popular of the opposing candidates, and four years later, the Whig party having been reunited, he was nominated as a compromise candidate, with John Tyler as his running mate, and defeated Van Buren, obtaining 234 electoral votes to the latter's sixty. The contest is noteworthy as having witnessed the introduction of enormous mass meetings and processions and picturesque emblems and banners. "Tippecanoe and Tyler too" was the great rallying cry of the Whigs. The Democrats, to show Harrison's unfitness for the Presidency, had sneeringly referred to an old log cabin attached to his house at North Bend, and to his table supplied with cider.

This jeer proved to be a boomerang, however, for the Whigs accepted the challenge and used small log cabins in the campaign as symbols of their candidate's sympathy for the plain people. At the close of this "log cabin and hard cider" campaign Harrison was elected by 234 electoral votes. The President-elect was then sixty-seven years old, and the exciting campaign left him ill prepared to resist an attack of pneumonia, that followed soon after his inauguration. On April 4, 1841, he died, and was succeeded by the Vice-President, John Tyler.

HARROW, an implement used by farmers for pulverizing the soil on plowed ground. The common harrow is a wooden frame, square or triangular, into which iron teeth have been driven. As the harrow is dragged over the ground by horses, it breaks up the soil and prepares it for the seed. What little grain is yet sown by hand is covered by harrowing. The wheel harrow has revolving disks of steel, instead of teeth, and is used to pulverize the soil on newly broken ground.

HART, ALBERT BUSHNELL (1854-), an American historian and teacher, born at Clarksville, Pa. He was graduated at Harvard in 1880 and soon after became an in-

structor in the institution, later being made professor of history. He early engaged in literary work and published numerous works on the history and government of America, of which the most important are *Introduction to the Study of Federal Government*, *Essays on American Government*, *The Formation of the Union* (Epochs of American History Series), *Guide to the Study of American History* (with Edward Channing) and a biography of Salmon P. Chase (in the American Statesmen Series). He was also the editor of the Epochs of American History Series, of the *American History Told by Contemporaries*, the *Source-Book of American History* and of the *American Nation*, a history of the United States by associated scholars. In 1914 he wrote *The War in Europe*, and in 1915 *The Monroe Doctrine, an Interpretation*.

HARTE, FRANCIS BRETT (1839-1902), an American poet and short-story writer, whose fame rests chiefly on his vivid tales of pioneer California. As a writer he used the name Bret Harte, dropping his first name and the final "t" of his middle name. He was born in Albany, N. Y. Sometime after the death of his father, his mother moved to California, and a year later, in 1854, Harte followed her. Shortly after his arrival, he spent several months in the gold fields of Calaveras County, and then rode the California stages as a messenger for the Wells Fargo Express Company. It was this early experience that brought him into contact with the scenes and characters that inspired the picturesque background and local color of his best stories. Harte was subsequently a teacher, apothecary's clerk and typesetter. In 1857 he was working in San Francisco as typesetter, contributor and editorial assistant on the *Golden Era*. In 1864 he was appointed secretary of the Branch Mint. He also made a connection with the *Californian*, a weekly; in this journal appeared his *Condensed Novels*, parodies on the styles of various authors. In 1868 Harte became editor of the *Overland Monthly*, in which were published the first of the stories that brought him fame—*The Luck of Roaring Camp*, *the Outcasts of Poker Flat* and *Tennessee's Partner*, also the humorous poem, *The Heathen Chinee*.

In 1871, after having served as professor of literature in the University of California, Harte went to New York to continue literary work. For several years he was in the consu-

lar service, stationed at Crefeld, Germany, and at Glasgow, Scotland. From 1885 until his death he lived in England, writing poems and stories of western life, the last of these being *Under the Redwoods*. Noteworthy among Harte's stories not already mentioned are *Two Men of Sandy Bar*, *The Twins of Table Mountain*, *The Three Partners* and *How Santa Claus Came to Simpson's Bar*. His most popular poem is *Plain Language from Truthful James*, better known perhaps as *The Heathen Chinee*.

HARTEBEEST, a species of antelope formerly found in large herds in South Africa, but now represented only by a few scattered specimens. The hartebeest is about four feet high and has a grayish-brown coat, varied by black markings on the face and a yellowish spot on the buttocks. The horns are heavily ringed, and they bend back sharply at the ends. In the days when it was eagerly hunted the hartebeest was considered the fleetest of all African antelopes, and it could even outrun the swiftest greyhounds.

HARTFORD, CONN., the capital of the state and its largest city and the county seat of Hartford County, 117 miles southwest from Boston, and 100 miles from New York City, on the Connecticut River and on the New York, New Haven & Hartford Railroad. The Hartford-New Britain Interurban, several motorbus lines and two airports serve public needs.

Manufacturing plants number over 360 and produce goods valued at \$78,600,000 or more each year; these include aircraft, asbestos products, beverages, brushes, carpets and rugs, railroad and electric cars, clothing, cutlery, firearms, hardware, iron and steel products, lumber products, musical instruments, sewing-machines, typewriters, washing machines and woolen goods. At Hartford are the home offices of many large insurance companies.

The principal buildings and institutions include the state capitol, the state library and supreme court building, the armory, the state office building, Trinity College, Hartford Seminary Foundation, Saint Thomas Seminary, Horace Bushnell Memorial Auditorium, the Children's Museum, the Morgan Memorial and the Avery Memorial.

The Old State House, the homes of Mark Twain, Harriet Beecher Stowe and Charles Dudley Warner, the site of the Charter Oak

and the offices of the *Hartford Courant*, America's oldest newspaper are points of historic interest.

About 1633 the Dutch built a fort here which they named "House of Hope." In 1635 and 1636 Puritan colonists including Thomas Hooker and Samuel Stone moved from New Town (now Cambridge), Massachusetts, and established a settlement here.

The freemen of Hartford, Windsor and Wethersford assembled here on January 14, 1639, and adopted the "Fundamental Orders of Connecticut," said to be the first written constitution ever drawn up in America. Hartford was the capital in 1701, and then shared that honor with New Haven, but since 1873 it has been the sole capital. Population, 1930, 164,072.

HARTFORD CONVENTION, a political convention held at Hartford, Conn., from December 15, 1814, to January 5, 1815. It represented the Federalist party's opposition to the War of 1812 and to the manner in which the Anti-Federalists conducted the war. Its sessions were secret, and there were false rumors that it planned the secession of New England. Its real aim was to propose reforms in the government in the direction of greater independence for the states. It was one of the events which increased the unpopularity of the Federalist party, and led to that party's downfall.

HARTMAN'S SOLUTION, a compound of simple drugs announced in 1936 as an agent for the deadening of pain in dental surgery. It was declared to be an inexpensive preparation; at a cost of sixty cents enough can be provided for 200 operations. The solution was named for its discoverer, a professor in Columbia University, who labored fifteen years to perfect it. He gave it to the public without recompense to himself.

HARUN-AL-RASHID, *hah roon' al rah-sheed'* (?-809), a celebrated Saracen caliph. He figures conspicuously in *Arabian Nights Entertainments*, as also do his wife, Zobeide, his vizier, Giaffar, and his chief eunuch, Mesrour.

He was not a fanciful character of fiction, as many have supposed, but was one of the most important characters of the eighth century. Harun was an enlightened monarch whose reign was brilliant, though he was despotic. His true character has been somewhat obscured because he has been too much idealized in the literature of the ages.



HARVARD UNIVERSITY, the outgrowth of the first college established in the American colonies, is to-day one of the largest universities in the United States. In scholarship and influence it likewise has a position among the very first American institutions of higher learning. On its graduate roster are found the names of many distinguished Americans, including Cotton Mather, John Adams and his son John Quincy, Theodore Park-

er, Emerson, Thoreau, Lowell, Holmes, George Bancroft, William H. Prescott, John L. Motley, Francis Parkman, Charles Sumner, Edward Everett, Wendell Phillips, Theodore Roosevelt, Franklin D. Roosevelt.

Harvard had its beginning in an act of the general assembly of Massachusetts Bay Colony, which on October 28, 1636, voted £400 (\$2,000) for a school to be established at New Towne (later Cambridge). In 1638 the school was named Harvard College in honor of Rev. John Harvard, who died that year, bequeathing the institution half his property (probably about \$2,000) and his library of 300 volumes. The first class of nine members was graduated in 1642. The same year the college was placed under the management of a board of overseers and in 1650 it became a corporation under the name of the President and Fellows of Harvard College; the overseers and the corporation still remain the governing board of the college.

In 1824-1825 a reorganization was effected, and the college became a university, with organized departments and provisions for special students. In 1851 the charter was amended in such a way that all mention of Church control was eliminated, and since then the institution, once a center of Unitarianism, has been free from denominational influences. The accession of Charles William Eliot to the presidency of Harvard, in 1869, was the beginning of a period of expansion and prosperity, and when Dr. Eliot relinquished his post in 1909 the institution was second to none in America in scholarly ideals

and prestige. To him is due the credit for the establishment of the elective system which is now generally adopted in the colleges and universities of Canada and the United States.

The university also introduced in 1916 the final examination in that department of learning which the student has made his specialty. In order to restore individual guidance the university tutor was introduced in that year. He counsels and encourages the student and has proved a great stimulus to scholarship and personal development.

Harvard University comprises the following principal departments: Harvard College; graduate schools of arts and sciences, business administration, education, law, medicine, architecture, engineering and divinity; museums of zoology, archaeology and ethnology; the Arnold arboretum, the Gray herbarium, Peabody Museum of American archaeology, and the astronomical observatory.

The university is heavily endowed; its property holdings total about \$100,000,000. In normal years Harvard has a student enrolment in all departments of about 7,800; with the summer students included it may reach to 10,000. The faculty numbers over 1,700. The university libraries contain over 3,600,000 volumes.

John Harvard (1607-1638), whose name is perpetuated in the university, was an English clergyman, born in Southwark, London. He was educated at Emmanuel College, Cambridge, and came to America in 1637, settling at Charlestown, Mass. His generous gift to the school at New Towne has been described above. In 1828 a monument in his honor was erected in the Charlestown graveyard, and there is a statue of him on the Harvard campus.

HARVESTING MACHINERY. See REAP-
ING MACHINES.

HARVEST MOON, a name applied to the full moon as it appears about the twenty-first of September, when the sun is crossing the equator. At this time the moon rises at nearly the same time every night for several nights in succession, and is a most beautiful spectacle in the heavens, giving out a light that in northern latitudes is nearly as bright as that of day. The brightness of the moon at this time is due to the fact that it is then traveling in that part of its orbit at which it makes the least possible angle with the ecliptic. In the southern hemisphere the harvest moon appears in March.

HARVEY, GEORGE [BRINTON McCLELLAN] (1864-1928), an American journalist, since 1899 president of the *North American Review* Publishing Company and editor of that publication. He was born in Peacham, Vt., and educated in an academy there and in the University of Vermont. For several years he was a reporter in Chicago and New York. In 1900 he became president of the publishing house of Harper & Brothers, but relinquished that post to give all his energies to the *North American Review*. During America's activity in the World War he edited *The War Weekly*, which later became *Harvey's Weekly*. He is forceful in all his writing, and is a severe critic of public men and measures. He was Ambassador to Great Britain from 1921 to 1923.

HARVEY, WILLIAM (1578-1657), an English physician, the discoverer of the true theory of the circulation of the blood. He entered Caius College, Cambridge, in 1593, and about 1599 he proceeded to Padua, then the most celebrated school of medicine in Europe. He took the degree of M. D. and returned to England in 1602. Settling in London, Dr. Harvey was admitted as a fellow of the College of Physicians, was elected physician of Saint Bartholomew's Hospital and in 1615 was chosen Lumleian lecturer. His views on the circulation of the blood were formally given to the world in his *On the Movement of the Heart and Blood in Animals*, published at Amsterdam in 1628. In 1623 he was appointed physician extraordinary to James I, and in 1632 he became the physician of Charles I. He was present at the Battle of Edgehill and afterward accompanied Charles to Oxford. Here he was elected master of Merton College, an office which he lost on the surrender of Oxford to the Parliament. Dr. Harvey returned to London in 1646 and spent the remainder of his life in retirement.

HARZ, hahrts, MOUNTAINS, a range of mountains about twenty miles wide, in Germany, extending a distance of sixty miles, through Prussia, Brunswick and Anhalt. The highest peak is the Brocken, 3,747 feet high, famous for the spectral shadows it throws on the morning and evening mists. Granite is the principal rock. Silver, copper, iron and manganese abound. The lower slopes are densely wooded with oaks, pines, and beeches, but the tops are bare. One of the principal occupations of the region has

been the raising and training of canaries. The scenery attracts many tourists.

HAS'DRUBAL, the name of several Carthaginian military leaders. Chief of these were the son-in-law and the son of Hamilcar Barca. Hasdrubal, the son-in-law of Hamilcar, succeeded the latter in command of the army in Spain in 228 B. C. He completed the subjugation of that country, which Hamilcar had begun, and founded New Carthage, now Cartagena, Spain. In 221 B. C. he was assassinated. Hasdrubal, the son of Hamilcar, on the departure of his brother Hannibal for Italy in 218 B. C., was left in command of the army in Spain, and carried on a long series of military operations against the Roman troops under the two Scipios. Hannibal requiring his assistance in Italy, Hasdrubal led an army from Spain into that country (207 B. C.), but before he could join forces with his brother he was defeated on the right bank of the Metaurus. It is said that the Roman commander had Hasdrubal's head thrown into Hannibal's camp, by way of announcing to the latter his brother's defeat and death.

HASHISH, *hash'eesh*, an intoxicating narcotic, made in Eastern countries from an Indian hemp, which is also called hashish. It produces a kind of intoxication, accompanied with ecstasies and hallucinations, ending in stupor and sleep. Hashish has been used to quiet pain in attacks of neuralgia and headache.

HASTINGS, BATTLE OF, the name given to the battle fought at Senlac, near Hastings, in 1066, between Harold II and William, duke of Normandy. Harold had promised to support William's claim to the throne, so the latter asserted, and when Harold allowed himself to be crowned king, William invaded England to assert his rights. The battle took place on August 14. The English were defeated, Harold himself was killed and England was brought under the rule of the Normans. This is regarded by historians as one of the fifteen decisive battles of the world.

HASTINGS, NEBR., incorporated in 1874, is the county seat of Adams County, ninety-six miles west of Lincoln, on the Chicago, Burlington & Quincy, the Missouri Pacific, St. Joseph & Grand Island, the Chicago and North Western and the Union Pacific railways. It is in the center of a fertile wheat belt and stockraising region, and manufactures agricultural implements, flour, brick,

cement, and has a large foundry, marble works and canning factories. It is the seat of Hastings College, an Adventist Sanitarium, business colleges, nurses' training school, a conservatory of music, and a state hospital. Population, 1930, 15,490.

HASTINGS, WARREN (1732-1818), an English statesman, the first Governor-General of India. He was educated at Westminster School and in 1750 was sent to Bengal, as a writer in the service of the East India Company. Hastings won distinction in Clive's campaign in 1757, and 1761 he removed to Calcutta, having obtained a seat in the Bengal council, but he returned to England in 1764. Returning to India five years later, he became a member of the council at Madras, and three years later he was made president of the supreme council of Bengal. In 1774 Hastings was made Governor-General of India, and although his administration was most able, he was sometimes obliged to resort to questionable means for securing the large sums of money which the East India Company constantly demanded. After eleven years spent as Governor-General, he resigned his office and sailed for England, leaving his empire in a most prosperous state. Shortly after his arrival in England, he was impeached by Burke and was charged with acts of injustice and aggression, with maladministration and the receiving of bribes. This celebrated trial, in which Burke, Fox, Sheridan and Grey were arrayed against him, began in 1788 and terminated in 1795 with the acquittal of Hastings. The East India Company in 1796 gave him an annuity.

HAT, a covering for the head, which differs from a bonnet in that it covers only the upper part of the head, and from a cap in that it has a circular brim. Hats are usually made of straw, silk or felt and are worn for protection or ornament. While the hat was known to the Greeks and Romans, yet as an article of dress it is of comparatively recent origin. It was never generally worn until in the fourteenth century, when the manufacture of felt hats was begun in Germany and France. Hats were introduced into England in the seventeenth century, where they replaced caps and bonnets, and the soft felt hat was introduced into America about the middle of the nineteenth century by the Hungarian patriot, Kossuth.

Felt hats were originally made of beavers' fur, but this material has been superseded

by the hair of rabbits, hare and muskrats, which now are more plentiful and less expensive than beaver. The hair is soaked in chemicals, which reduces it to a pulpy mass that can be pressed into sheets of felt. The felt is then molded into hats of various sizes and shapes. The popular *Derby* hat is made of felt which is stiffened while the material is on the shaping block. The hat is then dyed and again pressed on a block, after which the surface is smoothed and finished and the sweat band, lining and other attachments are added.

Straw hats are made by plaiting straw. The finest work of this sort is done in Italy, China, Japan and some of the countries of South America. There are two methods, one of plaiting the straw into braids, which are then sewed together to form the hat, and the other of weaving the straw into a fabric, which is pressed into the shape of the hats. The higher-priced hats, such as the leghorns and Panamas, are made on the latter plan. A silk hat usually has a tall, cylinder-shaped crown and a narrow, curled brim. The crown is made of a stiff board, covered with a glossy silk plush.

Styles in hats are constantly changing, as can readily be seen by comparing the pictures of costumes of different periods from the time of the Puritans to the present day. The Puritans wore a steeple-crowned hat. This was succeeded by the cocked hat common in Europe and America during the eighteenth century. This was followed by the felt hat.

HATTIESBURG, Miss., founded in 1885, is the county seat of Forrest County, ninety miles southeast of Jackson and 110 miles northeast of New Orleans, on the Illinois Central, the Southern, the Bonhomie & Hattiesburg Southern, and the Mississippi Central railroads. The city has a state normal college, the South Mississippi Women's College, Sacred Heart Academy, a business college, a library and two hospitals. The factories include a powder factory, a silk mill, cotton compresses, oil mills, foundries, a box factory, cabinet works and planing mills. The city is in the heart of the long-leaf pine belt. The commission form of government is in operation. Population, 1920, 13,270; in 1930, 18,601, a gain of 40 per cent.

HAUPTMANN, *howpt'mann*, GERHART (1862-), a distinguished German dramatist, who in 1912 was awarded the Nobel prize for idealistic literature. Hauptmann is a

thoroughgoing individualist. "Live your own life," he preaches. Without offering any solution, he depicts with powerful insight the struggles going on in everyday existence. His earlier plays, among them *Before Sunrise* and *The Weavers*, are morbid in their emphasis upon the less pleasant sides of life, but the later plays are idealistic, sometimes mystic, in tone. Of these latter *The Sunken Bell* is best known. Other works are a volume of poems entitled *Springtime* and a book of *Travel Sketches*.

HAUTBOY, ho'boi. See OBOE.

HAVANA, havan'a, or **HABANA**, hah-bah'nah, CUBA, the capital and largest city of the island republic. It lies on a beautiful harbor on the northwest coast of the island, ninety miles south of Key West, Fla. The view of Havana, as one approaches it from the sea, is most impressive. In the distance are the low, flat-topped Spanish homes of coral limestone, with modern hotels and office buildings rising high above them; while in the foreground are the old historic forts guarding the entrance to the harbor, Morro Castle on the left and the Castillo de la Punta on the right. When the Cubans were under Spanish rule, Havana was a picturesque but woefully unsanitary and inconvenient place. Since the war of independence, through American aid and influence the city has been modernized and taken its place among the most healthful and best managed municipalities of the world.

Along with the modern there is a Havana of irregular and narrow streets lined with quaint old buildings. A few portions of the original wall remain; also the revered cathedral, completed in 1724, which, so the Cubans claim, once contained the bones of Columbus; and the sixteenth-century fortress, La Fuerza, is pointed out as the place from which De Soto set forth on his quest for the Fountain of Youth. In marked contrast are the beautiful parks and boulevards, the Presidential Palace, the golden-domed Capitol and other government buildings. The center of the boulevard system is the tree-lined Prado (renamed Paseo de Marti), which traverses the city northward from Fraternity Plaza (formerly Colon Park), passes through Central Park and meets Malecon Ocean Drive. This fine boulevard is continued westward toward the suburbs and eastward along the harbor. Alameda de Paula is an attractive park facing

the bay. Havana is the educational and cultural center of the republic; among its institutions of learning are the University of Havana, the national library and Jesuit College.

During the winter season the palatial hotels are filled with tourists, and providing entertainment for them is an industry in itself. For miles along the ocean shore to the west are golf courses, country clubs, bathing beaches and a Casino rivaling that of Monte Carlo. Havana has the largest cigar and cigarette factories in the world and a thriving import and export trade. The port is visited by ships of every country. There is freight service with Key West by means of a train ferry, and daily passenger service to Miami by airplane. The city is the principal airmail center of the West Indies. It is on the Central Highway, one of the finest automobile roads in the world (see CUBA). Population, census of 1930, 584,893.

HAVELOCK, HENRY, Sir (1795-1857), a British soldier. He went to India shortly after entering the army and served with distinction in the Afghan and Sikh wars. On the outbreak of the Sepoy Rebellion (which see), he was dispatched to Allahabad, in order to support Lawrence at Lucknow and Wheeler at Cawnpore. On arriving at Cawnpore he found that Nana Sahib had massacred the prisoners. Pursuing his march to Lucknow, he defeated the rebels in various struggles and, finally, with the aid of Outram, won the Battle of Alam Bagh. Having captured Lucknow, Havelock and Outram were shut up there until relieved by Sir Colin Campbell in November, 1857. Havelock died shortly after the relief. He was raised to the rank of major general and was made a baronet and a Knight Commander of the Bath before the word of his death reached England.

HAVERHILL, MASS., in Essex County, thirty-three miles north of Boston, on the Merrimac River and on the Boston & Maine Railroad, built to the city in 1837. It is one of the leading American towns in the production of women's shoes, the shoe factories numbering 110. It has also extensive manufacturing of leather, machinery, vending machines, hats, woolen, boxboard and wooden and paper boxes. The principal buildings include a city hall, a public library, a Masonic Temple, several hospitals, an Elks' Home and Y. M. C. A. and Y. W. C. A. buildings.

There are twenty-eight parks, covering nearly 300 acres, and a landing field. The first settlement was made in 1640, on the site of the old Indian town Pentucket. Population, 1930, 48,910.

HAVRE, *ah'vr'*, FRANCE (formerly Le Havre de Grace), an important seaport, second in importance in the country, is in the Department of Seine-Inferieure, on the north side of the estuary of the Seine, 140 miles northwest of Paris. Among the chief buildings are the Church of Notre Dame, dating from about 1550, and the Palais de Justice. The fortifications are extensive and make Havre a fortress of first rank. The manufactures include chemicals, machinery, cotton goods, earthen and stone ware, paper, glass, oil, refined sugar and ropes. The chief dependence of Havre is on its commerce, which is the greatest of all French ports, except Marseilles. It has a large trade with England and the United States, importing large quantities of cotton, coffee, grains, hides and silks. Havre was used as a port for American troops and supplies in the World War. Population, 1921, 163,374.



Diamond Head,
near Honolulu

HAWAII, *hah wi'e*, or **HAWAIIAN**, *hah wi'an*, **ISLANDS**, a group of islands in the Pacific Ocean, constituting an organized territory of the United States. Described by Mark Twain as the "loveliest fleet of islands that lie anchored in any ocean," the Hawaiian lands are the joy of tourists from all over the world. Probably nowhere else on the globe does one find a more pleasant combination of scenery, climate and tropic bloom.

Originally they were known as the **SANDWICH ISLANDS**, a name bestowed in 1778 by Captain Cook in honor of his patron, the English Earl of Sandwich. The present name is taken from that of the largest island in the group. (The reader should also consult the article, entitled **TRAVELS IN DISTANT LANDS**.) The capital is Honolulu (which see).

The archipelago lies about 2,200 miles southwest of San Francisco and about 1,000 miles north of the equator. There are eight

inhabited islands and twelve that are uninhabited, and these extend for over 400 miles in almost a single line from southeast to northwest. Their total area is 6,449 square miles, divided among the inhabited islands as follows: Hawaii, 4,015; Maui, 728; Oahu, 598; Kauai, 547; Molokai, 261; Lanai, 139; Niihau, 971; Kahoolawe, 69. On Oahu is Honolulu, the capital and metropolis of the territory. Upon a small out jutting peninsula on the island of Molokai is a leprosarium. In 1930, the population (census) was 368,336. Of this total more than 117,000 were Japanese; 21,738, Hawaiian; 30,763 Filipino; 18,868, part Hawaiian; 26,000, Portuguese; 22,745, Chinese; and the remainder Porto Rican, Korean, European and American.

Surface and Drainage. The islands are of volcanic origin, with coral reefs partly lining most of them, but entirely encircling none. They are mountainous; but only Hawaii is actively volcanic. This island has two of the largest craters in the world, Mauna Kea and Mauna Loa, which are 13,805 and 13,675 feet high, respectively. On the eastern slope of Mauna Loa is the far-famed Kilauea (which see), the largest active volcano in the world (see, also subhead below, *Hawaii National Park*). The island is also traversed by other mountains, which give it a rugged and picturesque appearance; in places bold cliffs from 1,000 to 3,000 feet high front the sea. The Hawaiian coasts, especially those of Kauai, are indented with deep bays and inlets. There are six good harbors in the entire archipelago. Between the mountains and the coast extend fertile plains and valleys, where agriculture is extensively carried on. The rivers of Hawaii are mostly small mountain torrents.

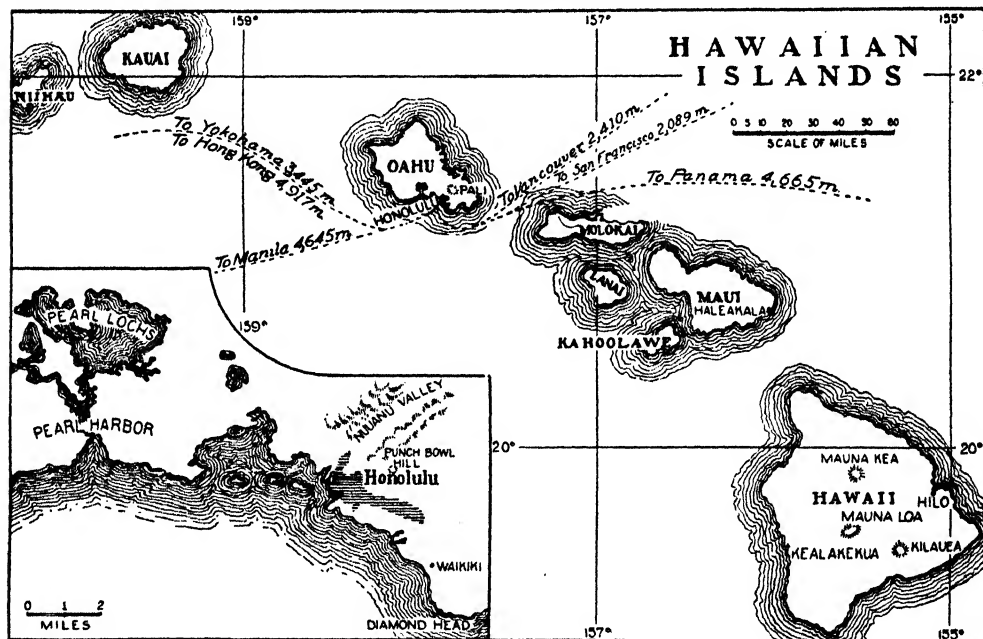
Climate. The climate of the Hawaiian Islands is as nearly perfect in respect to human enjoyment as climate can be. It is never too warm, and is never cold, and there is sea bathing all the year. The average temperatures of the lowlands are 70° in January and 78° in July, and the mean temperature is about 10° lower than that of other countries in the same latitude. Thunderstorms, though severe, are rare, and hurricanes are unknown. The rainfall varies in different localities, averaging from 100 to 250 inches a year at Hilo, in Eastern Hawaii, the "wettest city in the world." In Honolulu it averages about thirty-two inches a year.

In many agricultural sections irrigation is necessary. Artificial wells and surface water are utilized for this purpose.

Industries. Agriculture is the principal industry. The soils vary in different parts of the islands. In the highlands they are poor and thin, but in the lowlands they are rich and very productive. Sugar is the staple product in the low plains, and is grown very extensively. Higher up are found pineapples, coffee, fruits and vegetables and pasture grass. Over half the population is en-

cleaning of coffee are among the chief agricultural industries. Labor is a problem of the planters, but does not prevent development of the resources of the islands.

Hawaii National Park. Four tracts of land, on the island of Hawaii, and a small area on Maui Island, having a combined area of about 118 square miles, were created a national park in 1916. Their most remarkable scenic features are the world-famous volcanoes—Mauna Kea, the highest peak in the Pacific Islands; Mauna Loa, on whose eastern



gaged in the production of sugar; the crop averages a million tons yearly. Next in importance to sugar come pineapples. Rice is grown in the lowest flats and is cultivated mostly by the Chinese. Coffee is grown, excellent in quality though not great in quantity, especially on Hawaii Island.

The industry of most recent development is the raising of pineapples. The crop now ranges from 8,000,000 to 9,000,000 cases every year, and is increasing. Nearly all the pineapples consumed in the United States are grown in Hawaii. Another important industry is the raising of tobacco. On the upland pastures herds of live stock flourish, and these supply the islanders, in part, with meat, much however being imported from California and New Zealand. Sugar production, raw, the canning of pineapples and the

slope is the active crater Kilauea; and Haleakala, a mountain mass 10,000 feet high, on Maui, having on its summit a crater eight miles in diameter, the largest extinct crater in the world. See TRAVELS IN DISTANT LANDS.

Transportation and Communication. The position of the islands is favorable for communication with most parts of the world. The territory is on the line of vessels trading between ports of Western North America on the one side and Eastern Asia on the other, and its position is responsible for its commercial development. Regular modern, deluxe steamers come to Honolulu from San Francisco, Los Angeles, Vancouver, Sydney, Wellington, Yokohama, Hong-Kong, and Manila. In the inhabited islands good roads have been constructed, and there are 1,040

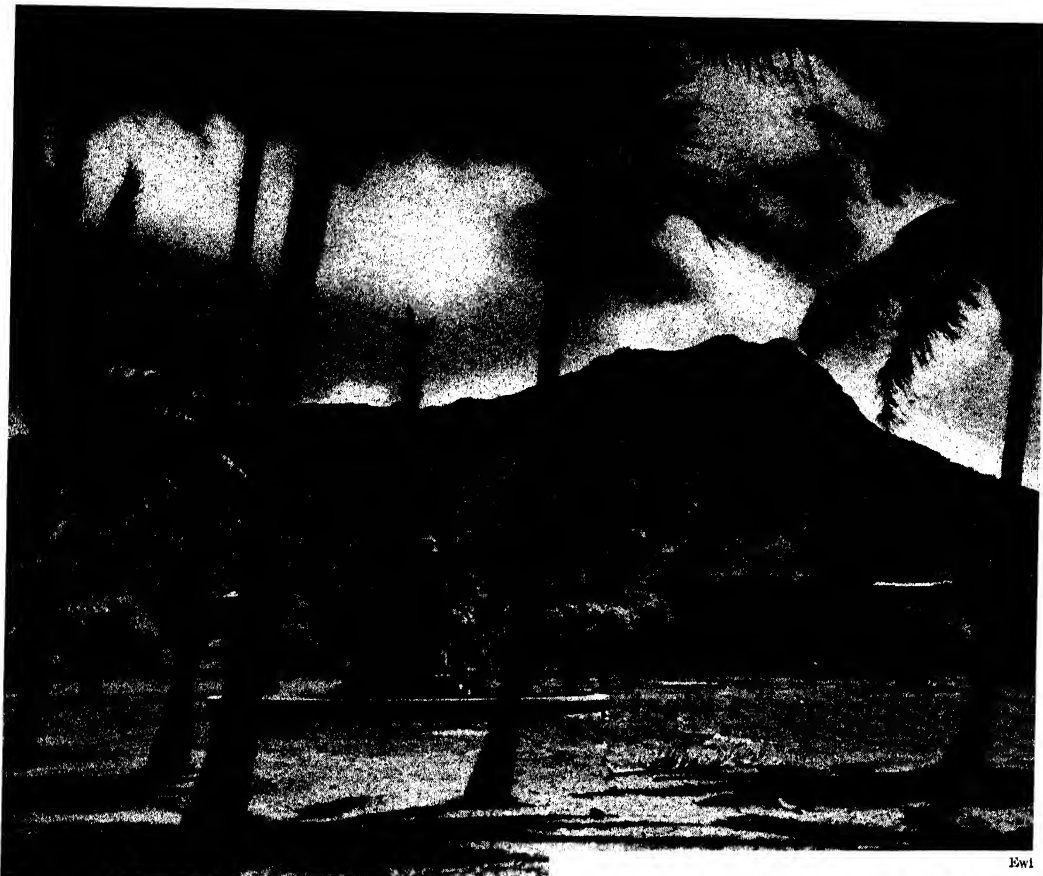


Keystone Views

SCENES IN COLORFUL HAWAII

Sailors from a warship of the United States and a group of bathing tourists are entertained by a hula dance. In the center is a surfboard rider, engaged in his thrilling pastime. There are few grass houses left in Hawaii today; once they were the rule rather than the exception.



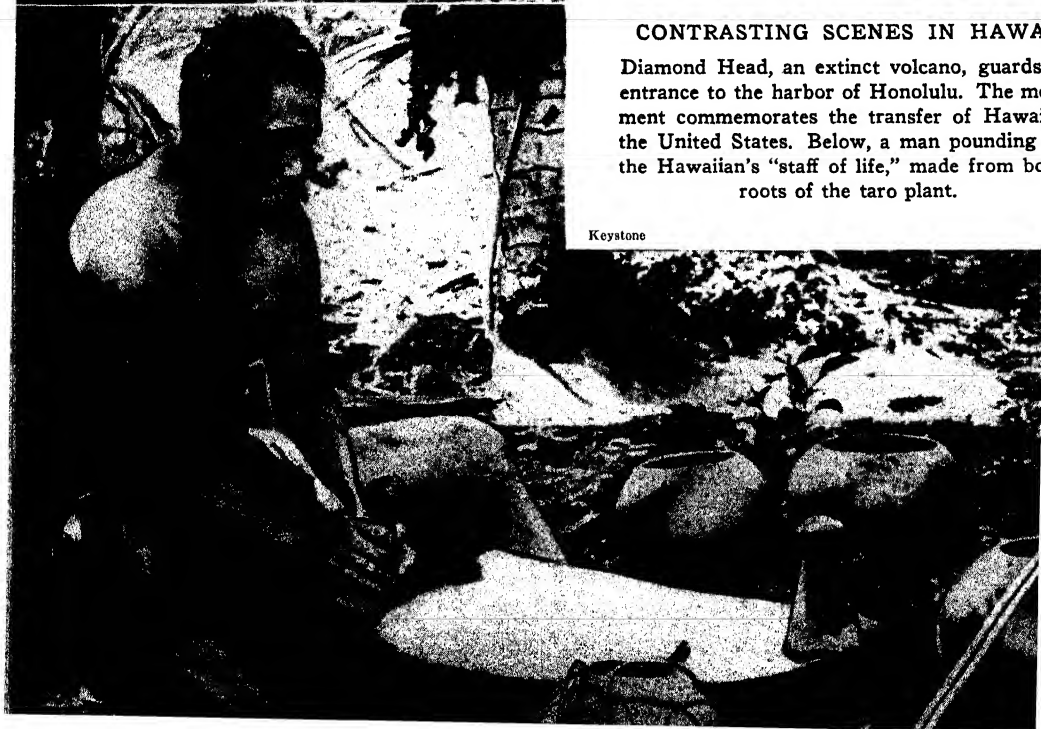


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CONTRASTING SCENES IN HAWAII

Diamond Head, an extinct volcano, guards entrance to the harbor of Honolulu. The moment commemorates the transfer of Hawaii to the United States. Below, a man pounding the Hawaiian's "staff of life," made from roots of the taro plant.

Keystone



miles of steam railway, including the mileage on plantations. The city of Honolulu has first-class electric railway service. Communication between the islands is by steamers, and all have airplane, cable, and wireless connection with the outside world. Inter-island airplane communication has been established.

Pearl Harbor, near Honolulu, is the largest harbor in the archipelago. It is one of the best and safest harbors in the world, and is used by the United States Navy as a naval base and by the Army and Navy as an air base (on Ford's Island). The harbor of Honolulu accommodates largest ocean vessels. Hilo Harbor, on the island of Maui, is also important.

Education and Religion. There are schools in all sections of inhabited Hawaii, and elementary instruction is everywhere free. English is the standard language in the regular schools, but there are in addition about 137 Japanese schools attended by about 14,000 Japanese pupils. There are over 63,000 pupils enrolled in the public schools, and over 8,000 in private institutions. The public schools numbered 187, and the private 63, in 1927. Children of many races and colors mingle in the public schools. Higher institutions of learning include the University of Hawaii, a normal and training school, reformatory industrial schools for boys and girls, a territorial trade school and schools for deaf and dumb.

The native Hawaiians are Christians. At Honolulu there are churches representing nearly all Protestant denominations, and the city is the residence of a Roman Catholic and an Episcopal bishop.

Government. The island group is governed as an organized territory of the United States. There is a legislature of two houses—a senate of fifteen members elected for four years, and a house of representatives of thirty members elected for two years. The governor and secretary of the territory are appointed for four years by the President of the United States. The territory is represented in Congress by a delegate, elected biennially.

History. The islands are said to have been discovered by Gaetano in 1555, and rediscovered in 1778 by Captain Cook, who met his death at the hands of natives, Feb. 14, 1779. In early times each island had a king, but under Kamehameha I the islands were formed into one kingdom, the final battle of conquest occurring in April, 1795. Kamehameha died

in 1819 and was succeeded by his son, Liholiho, who adopted on his accession the name of Kamehameha II, and whose reign was famous for the abolition of idolatry and the system of taboo throughout all the islands. Vancouver, who arrived with Cook in 1778 and returned in 1792 and again in 1794, made sincere attempts to enlighten the islanders, and he succeeded so far that he was requested by the king and his chiefs to send religious teachers to them from England. The first missionaries, however, who visited the islands came from America in 1820. The missionaries were well received, and the work of instruction was at once begun. Kamehameha II and his queen visited England and both died in London in 1824.

Until the year 1840 the government of the islands was a simple despotism, but in that year Kamehameha III granted a constitution, which provided for a government consisting of a king, an assembly of nobles and a representative council. In 1843 the independence of the Hawaiian kingdom was formally guaranteed by the French and English governments, following the seizure of the islands in that year by Lord George Paulet, British naval officer. Kamehameha IV (1854-1863) was succeeded by his brother, Kamehameha V. With his death in 1873 the direct line of the Kamehamehas became extinct, and the high chief, Prince Lunalilo was elected to the vacant throne. On his death in 1874 another high chief, David Kalahaua, was elected king.

This ruler died in 1891 and was succeeded by his sister, Liliuokalani. After her accession it became clear that she intended to demand a new constitution, restoring personal prerogatives, including the ruler's appointment of judges, etc. A revolution broke out headed by the progressive party of the state, and the queen was deposed. A provisional government was then formed, and overtures were made for annexation to the United States.

As these were not favorably received, the Republic of Hawaii was proclaimed July 4, 1894, with a constitution modeled after that of the United States.

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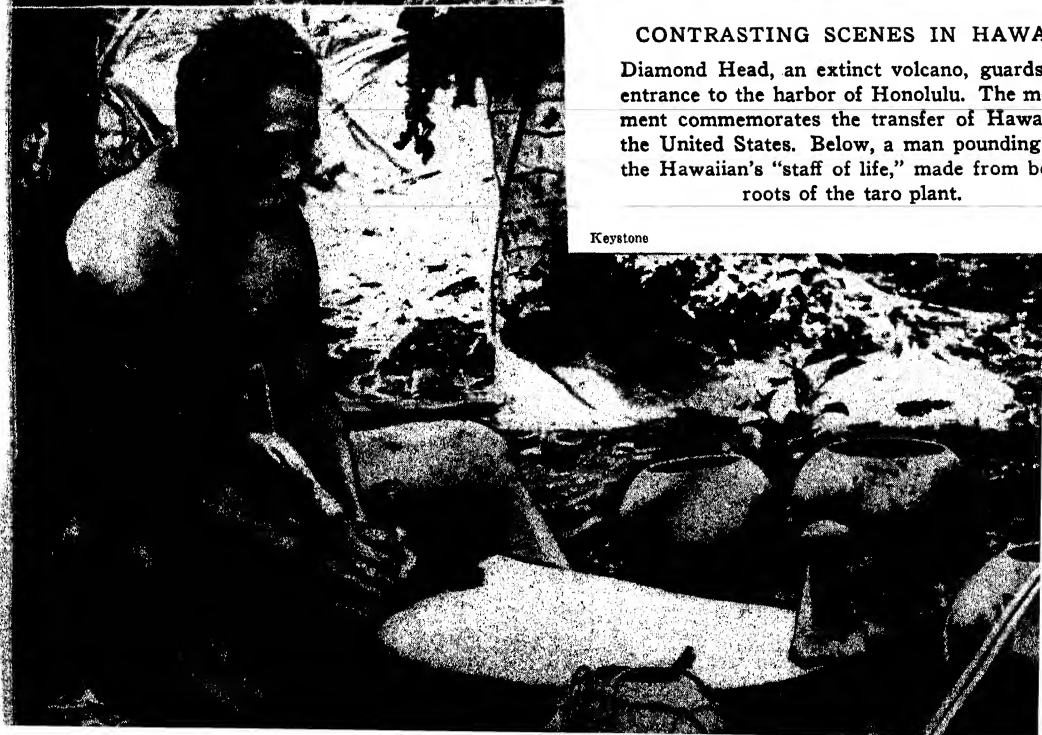


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which the President appointed a commission to visit the islands and draw up a plan of government. The United States took formal possession of the islands August 12, 1898. The act of Congress approved in April, 1900, made provision for a territorial form of government, and under this act Sanford B. Dole, formerly president of the republic, took the oath of office as governor in June, 1900, under appointment of President McKinley. Since that date the territory has enjoyed prosperity. The people are conscientiously loyal to the United States; they look to continental America for leadership in social and economic progress. Workmen's compensation laws and child labor laws have been passed. The people look forward to statehood.

Related Articles. Consult the following titles for additional information:

Cook, James	Mauna Loa
Kilauea	Molokai
Liliuokalani	Pineapple
Mauna Kea	Taboo

HAWK, a name given to many small birds of prey, though especially to those having shorter wings than the falcons and much resembling them in habits. In North America it is the common name for all the quick-winged species, varying in size from the large chicken hawk to the little sparrow hawk. They vary in length from ten to about twenty inches, and live chiefly on insects and very small animals, such as snakes, field mice and ground squirrels. Hawks have an evil reputation around the farmyards; some species kill birds and some poultry, but authorities declare they are an asset, when accounts are balanced, for they destroy much insect and animal life which is destructive to crops.

Related Articles. Consult the following titles for additional information:

Falcon	Kite
Hen Hawk	Sparrow

HAWKINS, ANTHONY HOPE (1863-1933), an English novelist, whose light and witty *Dolly Dialogues* attracted the fancy of a large circle of readers. After graduation from Balliol College, Oxford, he studied law and was admitted to the bar. His literary career began with a book entitled *A Man of Mark*, published under the name of "Anthony Hope." Later he wrote *Father Stafford*, *Mr. Witt's Widow*, *Sport Royal*, *Phroso*, *The Heart of Princess Osra* and *Double Harness*. His work is spirited and vigorous, highly romantic, and wholesome in tone. His most popular novels are *The*

Prisoner of Zenda and its sequel, *Rupert of Hentzau*. In 1919 he published *The Secret of the Tower*; in 1921 appeared *Lucinda*.

HAWKS'BILL, a large, inedible turtle, found in warm seas. It has a peculiar-shaped tail which serves as a weapon of defense. From this turtle, which is also called *loggerhead* and *caret*, is taken the tortoise shell, an important article of commerce. It is common in the West Indies and the islands of the South Pacific seas. See **TORTOISE**.

HAWK'WEED, a large family of plants injurious to crops. The flowers, usually yellow, are clustered on the end of a stalk about twice the length of the leaves, which grow from the ground. The weed may be exterminated from fields with salt, and also by plowing under and planting the land to hoed crops.

HAWTHORN, a thorny shrub or small tree of the rose family, found wild in many parts of Europe, in North Africa and Western Asia, where it is native. The real hawthorn has been introduced in North America. It is in general use in many places as a hedge and is cultivated for the white and rose-colored blossoms, which make the country landscape very beautiful. The tree bears a small red fruit, called a *haw*, which affords a winter food for birds. The American thorn apple belongs to the same genus.

HAWTHORNE, JULIAN (1846-1934), an American author, son of Nathaniel Hawthorne, born in Boston. He studied civil engineering in America and in Germany, but practiced that profession only a short time. He spent about ten years abroad, and while in Europe wrote *Bessant* and several other successful stories. Of the novels written after his return to America, *The Professor's Sister* and *John Parmlee's Curse* are noteworthy. His stories do not follow the common form of romance and have interesting touches of mystery about them. In 1913 Hawthorne was implicated in a mining promotion scheme that brought him under the investigation of the Federal authorities. Charged with misuse of the mails, he was tried and sentenced to serve a term in the Federal prison at Atlanta. The *Subterranean Brotherhood* is based upon his experiences there.

HAWTHORNE, NATHANIEL (1804-1864), the foremost of America writers of fiction, was born at Salem, Mass., July 4, 1804. His childhood, passed with his mother

at his father's home in Salem, was singularly free from the restraints of formal schooling. Spenser's *Faerie Queene*, Bunyan's *Pilgrim's Progress*, the works of Shakespeare and of Milton and the quiet natural scenes in which he loved to take solitary rambles were largely his teachers. When he was fourteen, he went with his mother to an uncle's at Lake Sebago, Maine, and here his love of solitude was still further developed. He spent much time wandering about in the unbroken forests or skating on the lake. The practice of taking solitary rambles, which became an established habit, bore fruit in later years, when his writing revealed the impressions made by the romantic scenery of his native New England. His wanderings through the White Mountains gave him the idea for one of his greatest short stories; the famous representation of a human face on Profile Mountain, in the Franconia group, inspired that beautiful allegory *The Great Stone Face* (see *WHITE MOUNTAINS*).

In 1821 Hawthorne entered Bowdoin College, where Longfellow and Franklin Pierce were his fellow students, and was graduated in 1825 without having distinguished himself as a scholar. The succeeding twelve years were passed in almost complete seclusion at Salem. He wrote much, but destroyed almost all that he wrote, because it did not satisfy him. Various articles were written for periodicals, but they attracted little interest, and although the reprinting in 1837 of some of these, notably *Twice-Told Tales*, won him praise, it did little toward helping him to maintain himself. Therefore in 1839 he accepted the position of weigher and gauger in the Boston customhouse, which position he held for two years.

After a year spent at Brook Farm in what was to him largely an uncongenial experiment, he married Miss Peabody of Salem and moved to Concord, to the house which he celebrated in his *Mosses from an Old Manse*. The four years spent in Concord were happy years, although the tales which he published in periodicals and the *Mosses from an Old Manse* afforded him but a scanty living. He was surveyor of the customhouse at Salem from 1846 until 1849, when a change of political parties removed him from office. Immediately on leaving the customhouse he published *The Scarlet Letter*, which made him famous on both sides of the Atlantic. Following this came *The House of the Seven*

Gables (1851) and the *Blithedale Romance*, the latter a thinly disguised account of his experiences at Brook Farm.

The election of his life-long friend, Franklin Pierce, to the presidency in 1853 brought Hawthorne an appointment to the consulship at Liverpool. After his term of office had expired, he spent a year and a half in Rome and Florence, and the record of his European sojourn was given in the *English Notebooks* and *French and Italian Notebooks*. The greatest result of this period, however, was *The Marble Faun*, published in 1860. On his return to America he brought out *Our Old Home*, which gives further impressions of England. The *Dolliver Romance*, begun in 1864, was never finished, for the failing health of the author compelled him to abandon his work and seek in travel to recover his strength. In the course of a tour made with ex-President Pierce he died suddenly at Plymouth, N. H. He lies buried in Sleepy Hollow Cemetery, Concord, Mass.

Hawthorne's was a rare personality, uniting in an unusual degree strength of intellect and will with an almost feminine refinement and sensibility. He was an optimist at heart, although frequently adjudged a pessimist because he made the gloomier aspects of life so commonly his theme. Descended from pure New England stock, his genius was a genuine American product and gave to the traditions and tendencies of the Puritan life their most fitting expression. Particularly was he fascinated by the drama that was enacted in the soul of the conscience-stricken Puritan. *The Scarlet Letter*, for example, is a classic not because it is a dramatic story of events, but because it is a masterly portrayal of the soul struggle of one who was tortured by a concealed sin. Another aspect of this idea is developed in *The Marble Faun*. The effect of conscience on the lives of his characters is a theme the author used many times. Hawthorne's romances and short stories are written in language that reflects the refinement of his own nature, for his style is remarkable for clearness, grace and beauty.

A biography entitled *Nathaniel Hawthorne and His Wife* was written by his son Julian. Hawthorne's bust was placed in the Hall of Fame, New York University, in 1929.

HAY, in the ordinary use of the term, grass cured for fodder, but in its broadest sense, hay may mean grass or various grains which have been cured for this purpose. The

plants ordinarily cultivated for hay are timothy and various sorts of clover and alfalfa.

Cultivated grasses are usually cut before they are quite ripe and allowed to dry by lying on the ground as they are cut. However, in localities where dew is heavy or rain is liable to fall, the hay is raked together at the close of the day and bunched. If not sufficiently dry for stacking, it is spread out the next day and allowed to remain until it is dry enough to stack or put into bales.

The Crop. The great hay states of the American Union in order of importance, are New York, Wisconsin, Minnesota, Nebraska, California, and Iowa.

In Canada the heaviest yield in the history of the Dominion was in 1930, when more than 18,500,000 tons were harvested.

HAY, JOHN (1838-1905), one of the most able of American diplomatists of the last generation, was born at Salem, Ind. He was graduated from Brown University in 1858, studied law and was admitted to the bar at Springfield, Ill., in 1861. The same year he left Illinois to become assistant secretary to President Lincoln, and subsequently he became his adjutant and aid-de-camp, positions which bore fruit in the *Life of Abraham Lincoln*, written by him in conjunction with Nicolay and considered the greatest biography of Lincoln. He took an active part in the Civil War, rising to the rank of colonel and assistant adjutant-general. From 1865 to 1870 he was secretary of several foreign legations. In 1870 he returned to the United States and entered newspaper work as one of the editors of the New York *Tribune*. In 1879 he was appointed assistant Secretary of State. He was appointed by President McKinley ambassador to Great Britain in 1897, and in the following year became Secretary of State.

In 1901 he negotiated the Hay-Pauncefote Treaty, concerning the Panama Canal, and was prominent in the settlement of international affairs in China in the same year. He remained Secretary until his death, winning a high reputation as the exponent of a frank and fair diplomacy. He was also well known as an author, among his works being several volumes of poems, essays and criticisms, notably, *Pike County Ballads*, *Castilian Days* and *Sir Walter Scott: An Address*.

HAYDN, hi'd'n, FRANZ JOSEF (1732-1809), a famous Austrian composer, called the

"father of instrumental music" because of the fundamental work he accomplished. To him the modern symphony is indebted for its permanent form and enlarged scope; in his hands the quartet became a model for all that followed; and his improvement of the sonata laid the foundation for its perfection by such masters as Beethoven and Mozart. Haydn had almost unlimited capacity for work, and left about 1,500 compositions, including, besides the forms mentioned, trios, oratorios, operas, concertos, minuets and waltzes, masses and canons. He believed thoroughly that music should have melody, and there is an unmistakable air of cheerfulness, even humor, in his work. His masses lack the austere dignity demanded by modern taste and are not used in churches to-day, but hymns are sung to the music of the Austrian national anthem, which he composed, and no choral music is more widely loved than "The Heavens are Telling," from his great oratorio *The Creation*. Personally, Haydn was a man of very lovable character, and his pupils and an appreciative public called him, affectionately, "Papa Haydn."

From Rohrau, his birthplace, Haydn went as a boy to Vienna, his excellent voice having obtained for him appointment as choir-boy at Saint Stephen's Church. Later he became a teacher of music, and from 1761 to 1790 was musical director to Prince Esterhazy. After this he went to England, where he published *Twelve Grand Symphonies* and wrote his opera *Orpheus and Euridice*. His famous oratorios the *Seasons* and the *Creation* were written after his return to Austria in 1794. This last contains music of rare beauty and power and may be regarded as the foundation of modern descriptive music.

HAYES, PATRICK CARDINAL (1867-), a cardinal of the Roman Catholic Church, occupying the chief post of that Church in the United States, in New York City. He was born in that city, received his preliminary education there, later taking theological courses in Troy, N. Y., and in the Catholic University of America. His first pastorate was in New York, then successively he was secretary to Monsignor Farley (later Cardinal), chancellor of the diocese, first president of Cathedral College, domestic prelate, auxiliary bishop, bishop, in 1919 archbishop, and in 1924 elevated to the College of Cardinals.



His birthplace,
Delaware, Ohio

HAYES, RUTHERFORD BIRCHARD (1822-1893), American soldier and statesman, nineteenth President of the United States. He was a man without personal political ambitions, and throughout a public career in which he represented the state of Ohio in Congress and served the people of that state as governor, he always acted according to

principle. Hayes was elected President at a time when the country had been outraged by corruption and scandal in high places, and it was his hope to remedy the evils that were then debasing the national life. If he did not succeed in bringing about a complete reformation, he did at least prepare a sure foundation on which the Presidents who followed him could build.

Early Career. Hayes was born at Delaware, Ohio, October 4, 1822. He was a posthumous child, his father having died in the preceding July. His mother was able to give him a good education, and in 1838 he was graduated from Kenyon College with high honors. After completing a course in law at Harvard, Hayes began the practice of his profession, settling finally in Cincinnati, where he was very successful. From 1858 to 1861 he was city solicitor of Cincinnati, and in that capacity won general admiration for his ability and integrity. When the city received word of the bombardment of Fort Sumter, he was made chairman of the committee which drew up resolutions of loyalty, and when the literary club to which he belonged organized a military company, he became its captain.

Hayes remained in the army until the end of the war, and rose steadily through the various grades, being given the rank of brevet major-general in March, 1865. Grant in his *Personal Memoirs* spoke of his conspicuous gallantry on the field, and of his display of qualities higher even than personal daring. In 1864 the Republicans of the Second Ohio district elected him to Congress, and in December, after the termination of the war, he took his seat. At the close of his term he was elected governor of Ohio, was reelected for a second term, and in 1871, at the end of four years of service, asked to

be permitted to retire to private life. In spite of his reluctance, the Republicans again nominated him for governor in 1875, and he won in a campaign which had as one of its slogans, "honest money."

Presidential Election Disputed. Ohio Republicans by this time had come to realize that Governor Hayes was a Presidential possibility, and in the national convention of 1876 he won the nomination without great difficulty, defeating such well-known leaders as James G. Blaine and Roscoe Conkling. In the campaign his Democratic opponent was Samuel J. Tilden. The election was one of the most exciting in American history because of the closeness of the vote. Hayes received a popular vote of 4,033,950, and Tilden, a vote of 4,284,885. The electoral vote was apparently 185 to 184, in Hayes' favor, but charges of fraud were made by both parties, and the decision was finally left to an Electoral Commission. This commission declared Hayes legally elected, and he was duly inaugurated. Throughout the whole affair, when the most bitter feeling prevailed throughout the country, both candidates acted with restraint and dignity.

His Administration. The administration of Hayes was notable in that it marked the end of reconstruction in the South. Though he lost much of his political backing by his decision to restore self-government to the former Confederate States, and was assailed by such zealots as Wendell Phillips and William Lloyd Garrison, the President's action was the beginning of peace and prosperity for the sorely tried Southerners. It is generally agreed that time has justified the wisdom and courage of Hayes. In accordance with his decision to end "carpet-bagging," Federal troops were withdrawn from all Southern States and the citizens in those states were permitted to settle their local affairs without interference. Another important event was the resumption of specie payments, on January 1, 1879. John Sherman, Hayes' Secretary of the Treasury, accumulated an ample gold reserve, and all greenbacks presented for exchange were promptly redeemed. The money question was troublesome throughout the administration, as there was a strong feeling that the silver dollar should be restored as a standard coin. Congress, in support of this movement, passed the Bland-Allison Act, which required the Secretary of the Treasury to buy between

Administration of Rutherford B. Hayes, 1877-1881

I. THE PRESIDENT

- (1) Birth
- (2) Education
- (3) Profession
- (4) Military career
- (5) Public life after the Civil War
- (6) Character
- (7) Death

II. END OF THE PERIOD OF RECONSTRUCTION

- (1) Disputed elections in Southern states
- (2) Withdrawal of Federal troops

III. CIVIL SERVICE REFORM

- (1) Civil Service Reform Association organized
- (2) Removal of Federal office holders for using influence politically

IV. FINANCIAL REFORM

- (1) Resumption of specie payments
- (2) Bland-Allison Act, 1878
 - (a) Restored equality of gold and silver currency
 - (b) Required purchase of at least \$2,000,000 worth of silver monthly
 - (c) Vetoed by the President but passed over the veto

V. A PERIOD OF AGITATION

- (1) Labor troubles
 - (a) Railway strike of 1877
 - (b) Miners' strikes
- (2) The negro exodus
 - (a) Movement of free negroes
 - (1) Principally from Mississippi, Louisiana and Texas
 - (2) To the West and Northwest
 - (b) Causes
 - (1) Forced to pay high rents
 - (2) Unjust system of land tenure
 - (3) Exorbitant prices charged by southern merchants
 - (4) No political recognition
- (3) Granger movement

- (a) Organized by farmers
- (b) To protect their interests
- (c) Became important political influence

VI. OTHER EVENTS OF IMPORTANCE

- (1) Telephone and electric light come into commercial use
- (2) Death of William Cullen Bryant, 1878
- (3) United States life-saving service established
- (4) Grant's tour of the world
- (5) Yellow fever epidemic in the South
- (6) Canadian fisheries award
- (7) Campaign and election of 1880
 - (a) Conventions
 - (1) Republican
 - (a) Nominated Garfield
 - (b) Platform
 - (1) Opposed Chinese immigration
 - (2) Defense of tariff system
 - (3) More pensions
 - (2) Democratic
 - (a) Nominated Hancock
 - (b) Platform
 - (3) National Greenback-Labor
 - (a) Nominated Weaver
 - (b) Platform

Questions

Give a brief account of Hayes' military career.

What public offices did he hold after his retirement from the army?

What act of his marks the end of the reconstruction period?

Who was Secretary of the Treasury when specie payments were resumed?

Give a short sketch of his public career. What did the Bland-Allison Act provide?

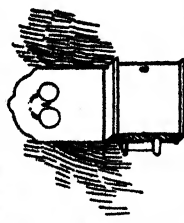
What were the causes of the railway strike of 1877?

1877

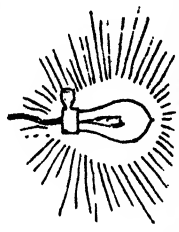
"He serves his party best who serves his Country best"

1881

HAYES' ADMINISTRATION



THE TELEPHONE GOES INTO GENERAL USE. 1877



ELECTRIC LIGHTING ADOPTED 1877

SOME HAPPENINGS DURING THE BUCKLEY PRESIDENTS' ADMINISTRATION -

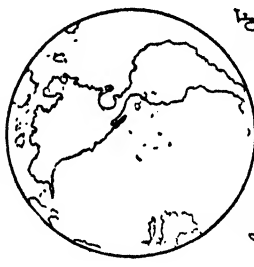
THE GREAT RAILROAD STRIKE. 1877.
CIVIL SERVICE REFORM INTRODUCED.
TROUBLE WITH NEZ-PERCE INDIANS.
GREAT TEMPERANCE MOVEMENT-1878.
DEATH OF Wm CULLEN BRYANT.
LIFE SAVING SERVICE ESTABLISHED 1879.
THE NEGRO EXODUS.
TENTH CENSUS - POP. 50,155,783.



1878
AWARD OF THE FISHERIES COMMISSION
AMERICAN FISHERMEN ALLOWED TO FISH OFF THE SEASIDE OF SCOTIA AND FRINGE ISLANDS.



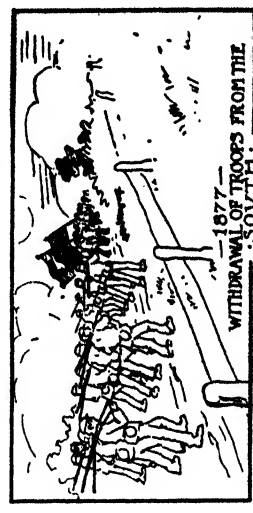
SILVER MADE A LEGAL TENDER - 1878-



1879
GRANT MAKES A TOUR OF THE WORLD -



THE GREAT YELLOW FEVER EPIDEMIC WHICH SWEEPED THE SOUTH IN 1878-9



1877 -
WITHDRAWAL OF TROOPS FROM THE SOUTH.

\$2,000,000 and \$4,000,000 worth of silver a month and coin it into dollars. This bill was vetoed by Hayes, but it was passed over his veto.

In his efforts to remedy the evils of the "spoils system," the President worked earnestly to establish a civil service commission, but he was persistently thwarted by Congress, and reform of the civil service had to be worked out by his successors. Among other events of his administration were the settlement of the Atlantic fisheries dispute, the organization of the United States life-saving service and the completion of jetties along the lower Mississippi under the direction of James B. Eads.

Later Years. Hayes refused to be a candidate for reelection, and at the age of fifty-nine found himself free to devote his energies to philanthropy and reform. He served on the board of trustees which administered the John F. Slater and the Peabody Educational funds, and was active in various charitable, prison reform and educational projects. On January 17, 1893, he died in Fremont, Ohio.

Related Articles. Consult the following titles for additional information:

Electoral Commission Specie Payments,
Reconstruction Resumption of
Washington, Treaty of

HAY FEVER, or HAY ASTHMA, *as mah*, an ailment that has all the symptoms of a severe cold, including profuse discharges from the nose, accompanied by sneezing, weeping eyes and a general feeling of lassitude and illness. Persons suffering from hay fever have annual attacks, occurring with great regularity at some time during the summer months. The majority of cases begin at some time in August and last till cold weather. The disease appears to attack persons in a weakened nervous condition and to be caused primarily by the pollen from plants or irritating dust from stables and other places. Medicines do not cure hay fever, but often a change of climate will give immediate relief. Physicians prescribe certain serums that are beneficial.

HAYNE, ROBERT YOUNG (1791-1839), an American politician, born in Colleton District, S. C. He was admitted to the bar in 1812 and soon attained prominence. He served in the War of 1812, at its close was elected to the legislature and in 1818 became attorney-general of his state. As a states' rights Democrat, he entered the United States Senate in 1823, where he vigorously upheld

the doctrine that slavery was not a subject for Federal legislation. He attained special fame for his brilliant debate with Daniel Webster upon the relation of the states to the Federal government, in January, 1830. In the nullification controversy of 1832 he upheld South Carolina and soon afterward resigned from the Senate, was elected governor of his state and issued a defiant proclamation guaranteeing the maintenance of the nullification ordinance (see NULLIFICATION). Later, however, he exhibited greater moderation and marked executive ability. From 1835 to 1837 he was mayor of Charlestown, and thereafter until his death was president of the Louisville, Cincinnati and Charlestown Railway.

HAY-PAUNCEFOTE, *pawns'foot*, TREATY, a treaty between Great Britain and the United States, negotiated in 1901 by Secretary of State John Hay for the Americans and Lord Pauncefote, ambassador to the United States, for the British. It recognized the right of the United States to construct, own and control a canal across the isthmus connecting North and South America and thus superseded the Clayton-Bulwer Treaty of 1850. It also provided that the United States should have undivided control of the canal, and should not be obliged to keep it open to all nations in the event of war. In 1914 a provision which excluded American vessels from payment of tolls through the canal was stricken out, for it violated the spirit of the compact, which assured equal rights to all nations in times of peace.

Related Articles. Consult the following titles for additional information:

Clayton-Bulwer Nicaragua Canal
Treaty Panama Canal
Mosquito Territory

HAYS, CHARLES MELVILLE (1856-1912), a North American railway manager, born at Rock Island, Ill., and educated in the elementary and high schools of that city. At the age of seventeen he entered the passenger department of the Atlantic and Pacific Railroad Company at Saint Louis, Mo. From 1878 to 1884 he was private secretary to the general manager of the Missouri Pacific; from 1884 to 1886 was secretary to the general manager of the Wabash; and in 1886 became first assistant general manager and then general manager. In 1894 he was chosen general manager of the reorganized Wabash Railroad. He next accepted the position of general manager of the Grand

Trunk at Montreal. He remained here four years, during which he reorganized the Central Vermont Railway Company, a subsidiary of the Grand Trunk, and double-tracked the line of the Grand Trunk from Montreal to Chicago.

In January, 1901, Hays became president of the Southern Pacific, but in the autumn of that year was recalled to Montreal to become second vice-president and general manager of the Grand Trunk. It was largely due to his efforts that the Grand Trunk Pacific Railway Company, of which he was president, was organized. On January, 1910, he became president of the Grand Trunk Railway Company. While returning from a trip to England, where he had made arrangements with the directors for further expansion, he lost his life in the *Titanic* disaster on April 15, 1912. Hays was one of the great constructive railway men of the continent.

HAYWOOD, WILLIAM DUDLEY (1869-1928), an American labor agitator, was born in Salt Lake City, Utah. From boyhood work in mines he rose to a commanding position in one of the organizations of labor, the Industrial Workers of the World (which see). Of this group he was secretary and its chief spokesman. The unsavory reputation of the I. W. W. reflected on Haywood and he was associated with several enterprises connected with labor which brought him in conflict with the law. One serious incident was the charge of complicity in the murder of Governor Steunenberg of Idaho in 1905, but in trial the charge remained unproved. In 1918 he and ninety-two others of his organization were charged with violating the espionage act, passed after America's entrance into the World War. Haywood and five others were sentenced to twenty years' imprisonment. In March, 1921, while out on bail he fled to Russia, and remained in Moscow until his death.

HAZE, a condition of the atmosphere which prevents one seeing objects through it distinctly. Haze varies in degrees of density and is caused in numerous ways, usually by quantities of fine dust. It may be raised by wind or by smoke arising from forest fires, or smoke arising from the burning of peat bogs, as in some portions of Europe. The color of the atmosphere and sky depends somewhat upon the formation of haze. That formed from smoke usually gives the atmosphere a dark, murky appearance, while that

formed from dust may cause the atmosphere and sky to appear light gray, yellow or some other color, according to the color of the dust. Haze preceding a rain storm is usually caused by the presence of minute particles of vapor. The color of such haze is usually light gray. See DUST, ATMOSPHERIC.

HA'ZEL, the tree that produces the nut called the filbert, or hazelnut. It is native to Europe, North Africa, Asia and North America. The nut is enclosed in a husklike bur, covered with fine barbs. The early frost opens these burs, and the nuts fall to the ground. Hazel trees never grow high. The leaves, which somewhat resemble those of the horse chestnut, turn a rich yellow in the fall. From the strong, flexible branches are made baskets, crates, whip-handles, hoops and such articles. A forked hazel branch in the hands of some persons has long been innocently thought capable of locating underground water and treasure.

HA'ZEN, WILLIAM BABCOCK (1830-1889), an American soldier, born in West Hartford, Vt., and educated at West Point. At the outbreak of the Civil War he was a captain in the regular army, but went to the front as colonel of a volunteer regiment. He won distinction at Shiloh, Corinth, Murfreesboro and Missionary Ridge, served through Sherman's Atlanta campaign, was prominent at the capture of Savannah and at the close of the war was brevetted major-general in the regular army. For fifteen years afterward he served on the frontier, except during his absence in Europe as a military attaché. In 1880 he attained the rank of brigadier-general, became chief of the signal service and accomplished a vast improvement in its equipment.

HAZING, *hays'ing*, at one time a common practice among college students. Hazers played practical jokes or inflicted punishment on newcomers or others whom it was desired to humiliate. Because hazing has been carried to such extremes as to cause serious injury and even death, it has been outlawed in all reputable institutions, and survives now chiefly in the form of harmless frolics.

HAZELTON, *há s'l'ton*, PA., a city in Luzerne County, about thirty miles south of Wilkesbarre, on the Lehigh Valley, and the Pennsylvania railroads. The city has a picturesque site, at an elevation of 1,700 feet,

in the anthracite coal region, and it has silk mills, knitting mills, foundries, machine shops and manufactories of lumber, pumps, shirts, and knitted under-garments. It contains a state hospital for miners, Saint Gabriel's Academy, two hospitals, and Pennsylvania State College Center (for first and second years). The place was settled in 1820, and was chartered as a city in 1890. The commission form of government was tried and later abandoned. Population, 1920, 32,267; in 1930, 36,765.

HEAD. See SKELETON.

HEADACHE, *hed'ake*, a sensation of discomfort in some part of the head other than the face, which may vary from a dull ache to the most severe pain. Headaches are but symptoms of bodily disorder, and are always a warning that some part of the system is not in normal condition. In most cases the nerves affected are registering a protest against the formation of poisons in the system. These poisons are often caused by foul air, indigestion, constipation or nervous fatigue. Headaches are also a symptom of eye strain, catarrh of the internal ear, malaria, typhoid fever, influenza, tonsilitis and other diseases. Violent pains in the head accompany tumor of the brain and other brain disorders. Headaches vary in location. A disordered liver usually produces a general headache; that from indigestion or constipation is felt across the forehead; that from eyestrain is felt behind the temples and in the eyeballs. Nervous prostration victims suffer from pain in the back of the neck.

Attention to daily habits will cure a large proportion of headaches. Fresh air, ventilation of the sleeping room, moderation in eating and abstinence from stimulants are foes to pains of this nature. Headache mixtures, except as prescribed by a reliable physician, should be avoided. Most of those advertised contain acetanilid, antipyrine and phenacetin, three dangerous substances. If headache persists in spite of attention to hygiene and diet, a doctor should be consulted.

HEALTH is that condition of the living body in which all the bodily functions are performed easily and painlessly. Perfect health is rarely seen, but the average person, by the application of a few simple rules, can keep his body in a very satisfactory condition. Practical suggestions along this line will be found under the heading PHYSICAL CULTURE.

HEALTH, **BOARDS OF**, organizations established by a government for the purpose of protecting the health of its citizens. Boards of health are municipal, state, provincial or national, according to the authority by which they are established and the region over which they have jurisdiction. The most important duties of city, or municipal, boards are to prevent the spread of contagious disease by enforcing vaccination and forming and enforcing strict quarantine regulations, to prevent the adulteration of medicines and food, to prevent the sale of injurious drugs, to see that the municipality is kept free from the accumulation of garbage and other material that is liable to cause disease; also, to prescribe and oversee the duties of coroners.

State boards of health have a more general line of duties than municipal boards, and their function in many cases is advisory. Nearly all states and provinces now have such boards, and their service is often of the highest value in preventing the spread of disease and in protecting citizens from the sale of injurious food products. During the influenza epidemic which swept over the United States in 1918, city and state boards worked in close coöperation.

In the United States there is no national board of health, the duties of such a body being assumed by inspectors of foods and drugs, and by the Marine Hospital Service, which is connected with the Department of the Interior. The duties of the Marine Hospital Service consist chiefly in enforcing United States quarantine laws, which are enacted to prevent the entrance into the country of persons afflicted with contagious or infectious diseases.

HEARING. See EAR.

HEARN, *hern*, LAFCADIO (1850-1904), a writer whose observations on Japan have given him a permanent place in literature. He went to Japan at the age of forty-one as a newspaper correspondent, but soon resigned that post and became a teacher of English in the University of Tokyo. Later he married a Japanese woman and became a citizen of the empire. Thereafter he wrote exquisitely on things Japanese, interpreting Japan to Europe and America. A dozen books on the subject came from his pen.

HEARST, *herst*, PHEBE APPERSON (1842-1919), an American philanthropist, the widow of Senator George Hearst, to whom she was married in 1862. Mrs. Hearst es-

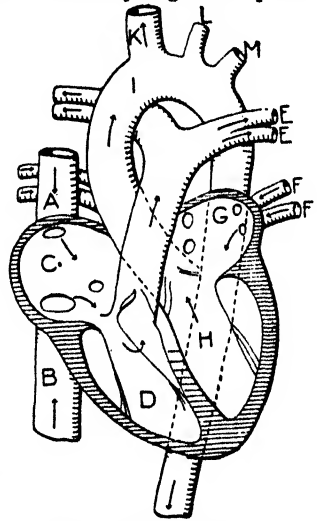
tablished kindergartens in California and maintained them until they became self-supporting; for ten years she supported a training school for kindergartners in Washington. She also established kindergartens in Lead, S. D., where she had mining interests. At Lead and Anaconda she built and maintained public libraries; at Washington, D. C., she established the National Cathedral School for Girls, at an approximate cost of \$250,000. She erected and equipped the mining building at the University of California as a memorial to her husband. She was the mother of William Randolph Hearst (which see).

HEARST, WILLIAM RANDOLPH (1863-), America's most widely-known editor and publisher, was born in San Francisco, the son of George F. Hearst, a former Senator from California. He received his education at Harvard University and then entered journalism, becoming editor and proprietor of the San Francisco *Examiner* in 1886. He later bought the New York *Journal* and *The Advertiser* and established the *Chicago Examiner* (morning) and *American* (evening paper). Later he established or purchased the Los Angeles *Examiner*, the Atlanta *Georgian*, the Boston *American* (later abandoned), and a Jewish daily in New York City. In addition to the above daily papers he owns *Good Housekeeping*, *Motor*, *Hearst's Magazine* and the *Cosmopolitan Magazine*. In 1918 he purchased the *Chicago Herald* and merged it with the *Examiner*. Later he purchased other metropolitan newspapers until he owned twenty-eight. Hearst introduced "yellow journalism" to America, prefacing the news with glaring headlines. He made large investments in moving pictures. When foreign news service was lost to his papers through abuse of privileges he established the International News Service.

He was elected to Congress from New York and was made president of the National League of Democratic Clubs. He was a candidate for the Democratic nomination for President of the United States in 1904, and was defeated for the office of mayor of New York City on the municipal ownership ticket in 1905. He was the candidate of the Democratic party of New York for governor of the state in 1906, having first been nominated by an independent party created through his efforts. His newspapers are Democratic in national politics, but they often antagonize the party; an example was found in their

opposition to the "New Deal" policies of President Franklin D. Roosevelt and support of the Republican ticket in 1936.

HEART, *hart*, the most vital organ of the body. Its special function is to pump blood through the veins and arteries, and this task it performs day and night so long as there is life in the body. If the hand be placed between the fifth and sixth ribs a little to the left of the breastbone the beat or stroke of the heart can plainly be felt. This beating goes on continuously at the rate of seventy-two strokes a minute for the adult in normal health; in a single year the heart beats about 37,000,000 times. It has been estimated that one day's work of this busy organ is equivalent to the energy expended by the leg muscles of a man weighing 165 pounds who climbs a mountain 2,500 feet high. The only rest which the heart muscle gets is in the pause which occurs between beats. Rapid beating of the organ lessens the rest periods and causes the heart to become fatigued. Every six minutes it sends every drop of blood in the body through the kidneys.



HEART AND BLOOD VESSELS

A, B, Superior and inferior venae cavae; C, right auricle; D, right ventricle; E, E, pulmonary artery and branches; F, F, pulmonary veins; G, left auricle; H, left ventricle; I, aorta; K, innominate artery; L, left carotid artery; M, left subclavian artery.

The heart in man is a cone-shaped organ, situated in the chest behind the breastbone and placed obliquely in an inverted position. The base points upward, inward and to the right, and the apex downward, outward and to the left. The heart is slightly to the left of the median line of the body. It is suspended in the chest by the large blood vessels attached to it, and is surrounded by a serous membrane known as the *pericardium*. A similar membrane of finer texture, known as

the *endocardium*, also lines the cavities. The heart of an adult is about five inches long, its greatest diameter is three and one-half inches, and the average weight is nine ounces for women and eleven for men. The walls are constructed of muscular fibers, and the muscular partition called the *septum* separates the organ into right and left sides.

The left side contains the *left auricle* and *left ventricle*, and the right side, the *right auricle* and *right ventricle*. The right side of the heart forces the blood through the lungs and is connected with the pulmonary circulation. Because of the functions of this part of the heart the muscular walls are much thinner and weaker than those of the left side, whose function it is to force the blood through the arteries in the systemic circulation. The auricles occupy the base of the heart and are formed by very thin walls. The right auricle receives the blood from the *superior* and the *inferior vena cavae*, and the left auricle receives it from the *pulmonary veins*. The ventricles occupy the apex and force the blood through the arteries.

Between the auricles and ventricles are valves, composed of a thin, strong white membrane, whose folds are so arranged that they allow the blood to flow from the auricle into the ventricle, but prevent its return when the muscles of the heart contract. The valve on the right side is known as the *tricuspid*, and that on the left side is called the *bicuspid*, or *mitral*, valve. The openings into the arteries are also guarded by valves, which in shape resemble a half-moon and are called *semi-lunar* valves. The course of the blood through the heart is illustrated in the diagram. Its circulation through the lungs and body is explained under the heading **CIRCULATION**.

To keep the heart strong and healthy one should not overwork or exercise too long or too violently. Tobacco and alcoholic liquors have a weakening effect and should be avoided.

HEARTS, a game of cards which may be played by two or more persons. If more than four play, two packs of cards are generally used. The object of each player in the game is to get rid of his heart cards. There are several varieties of this game, the directions for which may be found in any standard book of rules. In a common form of hearts the cards are dealt out until all players have the same number. The first player to the left

of the dealer plays any card he likes, and each of the others must follow suit, if he can; if he cannot do so he has an opportunity to play off a heart card. The person playing the highest card of the suit led takes the trick, and must lead off on the next round. When all cards have been disposed of the heart cards are counted, and the score of each person is marked down. When a specified score is reached by any player the game ends. The one with the lowest score is the winner. The queen of spades, called the "Lizzie," counts 13; an ace of hearts counts 14; a king, 13; a queen 12; a Jack, 11; and each of the other cards the equivalent of the spots marked on them. Occasionally, however, each ace and face-card counts 10. It is sometimes customary, before a round begins, for each player to pass to his left-hand neighbor any three cards he desires, thus relieving his hand of dangerous cards.

HEAT, *heet*, a degree of warmth manifested to the senses. It is a relative term, without definite standards; an object may be called hot by one person and warm by another. A hot body possesses a very considerable amount of heat; a warm body, a medium amount. Even a cold body, as ice, contains some heat. The *temperature* of a body indicates its degree of heat, and it is measured by the thermometer.

What Heat is. Heat is supposed to be produced by the motions of the molecules of bodies (see **MOLECULE**). However close together these molecules may appear, they are not supposed to touch one another, and they are supposed to have a constant motion, called *vibration*. It is also supposed that all space, even that between the molecules, is filled with an immaterial and invisible substance, called *ether*. This ether conveys to other bodies the heat produced by the vibration of the molecules (see **ETHER**). When this vibration increases, the temperature of the body rises, and when it decreases, the temperature falls.

Where Heat Comes From. The sun is the great source of heat. It warms the earth and all things on it. The stars also give off heat, but they are so far distant that we do not receive it. Mechanical action, such as rubbing bodies together, hammering them or compressing them into a smaller space, produces heat. Our hands are warmed by rubbing them together; a nail is made hot by hammering it; the barrel of an automobile

tire pump is warmed by the compression of the air while it is being forced into the hollow tire.

Chemical action, such as fire, produces heat. Fire is caused by the union of the oxygen of the air with the carbon in the fuel. The heat in the human body is produced by the action of the blood and digestive fluids upon the food, and also by the action of the oxygen of the air upon the carbon with which it comes in contact in the lungs.

How Heat Travels. Heat travels in three ways:

(1) **By conduction.** Heat travels by conduction, which means transmission by a conductor, when it passes from one part of a body to another part, without any noticeable movement in the body; such is the heating of the entire length of a stove poker when one end of it is placed in the fire. If a silver spoon be placed in hot tea, the heat passes from the tea to the hand through the spoon. Bodies through which heat passes readily by conduction, such as metals, are called good conductors; those through which it does not pass readily, such as wood, wool, fur and feathers, are called poor conductors. For this reason, iron tools are fitted with wooden handles; if used when hot, they do not burn the hand, and if used when cold, they do not conduct the heat away from the hand. Fur garments keep us warm, not because they produce heat, but because they prevent the heat of the body from passing off into the air.

(2) **By convection.** Heat travels by convection, that is, by transfer or transmission, when it is carried by the circulation of the body itself; a good example is the warming of buildings by hot air from a furnace, or by hot water carried through pipes. This mode of carrying heat is also used for a number of other practical purposes.

(3) **By radiation.** Heat comes to us by radiation from the sun; also, from a grate, a hot stove or the flame of a lamp. When it travels in this way, it always comes in straight lines and decreases in intensity as the distance from the source increases. That is, to be exact, the amount of heat varies inversely as the square of the distance from the source. If standing four feet from a fire you receive a certain amount of heat, you will receive only one-fourth that amount when eight feet away.

What Heat Does. The work performed by heat may thus be summarized:

(1) It makes bodies larger. When a body is heated, it increases in size. If an iron bar, which exactly fits a hole in an iron plate, is heated, it becomes too large to pass through the hole. This increase in size is called expansion, and it can be easily seen by observing the liquid in a thermometer; as the tem-

perature rises, the liquid expands and rises in the tube. The force which accompanies the change of size in bodies on account of heating and cooling is very great and is turned to a number of practical uses. Wagon tires are made just a little smaller than the rim of the wheel; they are then heated, when they become large enough to fit upon the wheel; as they cool, they contract and draw the parts of the wheel firmly together. Steel frames of buildings, the trusses of bridges and the plates of boilers are riveted with red-hot rivets; as the rivets cool, they draw the parts so firmly together that they make these structures very solid and strong.

(2) It changes solids to liquids. Ice is changed to water and metals become liquid when heated to a sufficient temperature. The temperature at which a substance changes from a solid to a liquid is called its melting point or fusing point. The melting point of most metals is very high.

(3) It changes liquids and solids to vapor. Some substances, such as camphor and zinc, when heated to a high temperature, take the form of vapor instead of liquid. When liquids are raised to the boiling point, they change to vapor, as boiling water changes to steam. The vapor occupies much more space than the liquid, and its expansive force is very great. In the case of steam, this force is used in the operation of the steam engine.

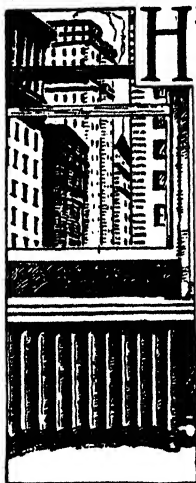
(4) It produces light. When certain substances are raised to a high temperature, they give off light, as a white-hot iron, a glowing coal, a flame, or an incandescent light. All such substances radiate both light and heat which come to us together.

Related Articles. Consult the following titles for additional information:

Combustion	Heating and
Energy	Ventilation
Ether	Melting Point
Expansion	Sun
Fire	Temperature
Freezing	Thermometer

HEATH, *heeth*, or **HEATHER**, *heth'er*, the popular name for a large family of plants to which belong the cranberry, huckleberry, rhododendron, azalea and trailing arbutus. It is widely distributed over Europe and abounds in South Africa. From 400 to 500 species are known. Many of them bear flowers of brilliant color. Scotch heather has low, grayish, hairy stalks and broom-like branches, with needle-shaped leaves and sprays of countless, tiny, purple blossoms. In Scotland the poor use heather for thatching their houses, and in other European countries the plant is used in making brooms, brushes and mattresses. One species only of heather is found in the United States and Canada, and that grows sparingly in a few localities on the Atlantic coast, but a few varieties are cultivated by florists. The large

heather-covered tracts in England were called heaths, and this name has consequently been applied to any desolate, uncultivated tract covered with shrubs and coarse herbage.



HHEATING AND VENTILATION. In regions where artificial heating of houses at certain seasons is necessary for health and comfort, the problem of supplying such warmth is closely related to that of providing ventilation. It is a well-known fact that any closed room in which people remain for any length of time must be supplied with fresh air. It is also true that a certain degree of warmth is necessary for the human system. A ventilated room

without the proper degree of warmth is as much a menace to health as a heated room without ventilation. Hence the reason for treating heating and ventilation as related subjects.

Heating Systems. In America the temperature which is usually considered best in a room whose occupants are not engaged in any exercise varies from 68° to 70° Fahrenheit. In Europe people are accustomed to temperatures much lower than these, but they wear heavier clothing than do Americans. Overheated rooms are responsible for much sickness in cold weather, because of the inevitable sudden changes experienced in passing in and out of doors. On the other hand, too low a temperature is injurious, especially to those who are sitting quietly.

One of the earliest methods of heating rooms was by the open fireplace, and this still remains an excellent method, though the waste of heat is considerable. It was this waste, in fact, that led to the introduction of closed stoves, first made of earthenware and then of metal. These are now constructed in an infinite number of varieties and are commonly in use throughout America and in Europe. They do save fuel, but in so doing they have prevented the ventilation which fireplaces gave and are liable to overheat the rooms and render the air too dry.

Other methods of heating are now generally in use. Air-tight furnaces, sur-

rounded by jackets, connected by pipes with different parts of the building, from which return shafts bring foul air into the furnace proper, are common (see FURNACE). In such cases a conduit from the open air leads a supply of pure air inside the jacket of the furnace.

What is known as the pipeless furnace has been found an economical device for heating small houses. The furnace is placed in the



HEATHS

Three species in blossoms.

basement directly below the center of the house, and the warm air flows up through a central register and circulates through the various rooms. These must all be connected by archways or wide openings. There is a constant circulation of warm air upward and cold air downward, the latter flowing back to the heater through cool-air returns, to be reheated. At the bottom of the heater there is a device which washes the air, purifying and moistening it.

In other systems, steam and hot water are forced through pipes to all parts of buildings, and this forms an effective way of warming the rooms, though a separate system of ventilation must be used to make either steam or hot water satisfactory. From their superior neatness and cleanliness, steam and hot water seem to be gradually displacing the hot-air systems.

Ventilation. Ventilation is a means of renewing the atmosphere in rooms and of

maintaining its purity by driving out foul air and admitting fresh air without drafts. Carbonic acid gas, which is breathed from the lungs of all animals, is injurious if breathed again into the lungs. Moreover, the human breath pollutes the air with small quantities of ammonia and with organic matter, especially bacteria, and so tends to make the atmosphere not only unpleasant but dangerous for respiration. Authorities disagree in estimating the amount of pure air necessary for an adult, but it is generally admitted that not less than 1,800 cubic feet of fresh air per hour should be allowed for each healthy person. Invalids require from three to four times as much.

It is possible, of course, to secure change of air in a room very quickly by throwing open doors and windows, but the sudden change in temperature and the resulting drafts are dangerous to the occupants. Accordingly, in all living rooms some provision must be made for the removal of foul air and the introduction of fresh air. This is particularly important in sleeping rooms, where the windows should be opened from top and bottom. For protection against drafts, screens may be placed near the bed or window. Large buildings, such as halls and theaters, are generally ventilated by mechanical systems. One in some use is called the *plenum* system; the fresh air is forced in by blowers.

Air Conditioning. One of the latest advances made in that phase of sanitary science which relates to heating and ventilation is known as air conditioning. Progress to the present degree of perfection rests upon man's knowledge of what constitute the factors of health and comfort within doors, coupled with his ingenuity to devise mechanical forces working automatically to produce a combination of beneficial results. Healthful conditions within a room require that the air be neither too warm nor too cool, that humidity (degree of moisture) be maintained at the correct standard, that the air shall be constantly in motion, and be kept pure.

Air conditioning is now entirely practical, whether throughout a seventy-story building as that in Rockefeller Center (Radio City), New York, or in a single room in a dwelling house. A typical air conditioning system may be described for a large building: a conditioning apparatus; a fan to produce a forced draft; a conduit system for conveying air which has undergone treatment from the fan

to any predetermined location; a return conduit system for returning used air into the conditioning chamber; an outlet for additional air to the conditioning chamber; a water spray for cleansing and humidifying or dehumidifying the air and for cooling it in summer; a steam-heating unit for winter; an air filter to remove impurities; in some cases a refrigerating machine to cool the sprayed water in hot weather. The progress is from refrigerating unit to spray chamber (where purification occurs); purified air to the conduits; release into rooms of a building; return conduits to the conditioning chamber, for purification again.

For a further discussion of this subject see Domestic Science subhead Ventilation.

HEAVES, heevz, or BROKEN WIND, a disease in horses often accompanied by an enlargement of the lungs and heart, which disables them for bearing fatigue. In this disease the expiration of the air from the lungs occupies double the time that the inspiration does and requires also two efforts. It is caused by rupture of the air cells, and there is no known remedy for a well established case, though change of diet has been known to cure mild cases.

HE'BE, in Greek mythology, the goddess of youth and the cupbearer to the gods, a daughter of Jupiter and Juno and the wife of Hercules after he had been made a god. According to some accounts she gave up her celestial office when she became the wife of Hercules; according to others, she was dismissed because she stumbled while serving the gods. She was succeeded by Ganymede. See GANYMEDE.

HEBERT, a bair', JACQUES RÉNE (1755-1794), a French journalist and politician, popularly known as Père Duchesne, from the revolutionary journal of that title which he founded at the outbreak of the Revolution. The radical opinions and violent language of this journal made Hébert popular with the people, and he was elected attorney-general of the commune and a member of the National Convention. As a member of the committee appointed to try Marie Antoinette, he increased her sufferings by the malicious and brutal charges which he brought against her. His violent methods were recognized by Robespierre as a menace to the cause of the Revolution, and he was accordingly put to death on the guillotine, by order of the revolutionary tribunal, in March, 1794.

HEBREW LANGUAGE AND LITERATURE, the language which the Hebrews wrote and spoke, and the books they produced during their settlement in Palestine as an independent nation, and which has survived to the present day. The Hebrew alphabet is composed of twenty-two consonants; the vowels are expressed by marks placed above or below these letters, making possible verb conjugation and noun declension. There is no neuter gender, and the writing is from right to left.

Extant Hebrew literature is almost entirely comprised in the Old Testament, which represents a period of at least one thousand years, from 1200 B. C., when some of the poetical portions, such as the song of Deborah in the fifth chapter of *Judges*, were already in existence to 200 B. C., or later, when the book of *Daniel* and some of the *Psalms* were written. During this period the written language underwent surprisingly little change. In passing from the book of *Genesis* to the books of *Samuel* we do not recognize any very striking difference in the language. Even those who assert that the Pentateuch as a whole is of a comparatively late era admit the great antiquity of some of its contents, which do not differ in language from the rest. The writings which belong to the period following the Babylonian captivity differ from those which belong to the preceding age; the influence of the Aramaic or Chaldee language, acquired by the Jews in the land of their exile, greatly corrupted their tongue. Belonging to this age are the historical books of *Chronicles*, *Ezra*, *Nehemiah* and *Esther*. In the prophets who prophesied during and after the captivity, with the exception of *Daniel*, the Aramaic element is not so strong as might be expected, the style adhering to that of the older prophets. At what time Aramaic became the dominant element, it is impossible to determine, but by the time of the Maccabees it had become the spoken language. The fragments of the popular language in the New Testament are all Aramaic, and ever since that time the ancient Hebrew has been preserved and cultivated only as the language of the learned and of books, and not of common life.

After the return from the captivity, the Jewish literature was carefully cultivated. Under *Ezra* the Scriptures were collected and arranged into a canon. The Pentateuch

was publicly read, taught in schools and translated into Aramaic. The legal or religious traditions explanatory or complementary to the law of Moses were collected and established as the oral law. These labors resulted in the *Midrash*, a general exposition of the Old Testament, divided into the *Halacha* and the *Haggada*. To the epoch following the Maccabean belong some celebrated doctors of law—Hillel, Shammai, Gamaliel.

On being driven from their capital by the Romans, numerous schools were established by the Jews in which their language and literature were taught. Of these schools the most celebrated were those of Babylon and Tiberias. The *Mishna*, which contains the traditions of the Jews and interpretations of the Scriptures, is supposed to have been compiled in the latter part of the second or in the earlier part of the third century; and the rabbis of Tiberias and Babylon wrote numerous commentaries on it, which were at length collected into two separate works, the *Jerusalem Talmud*, completed about the end of the fourth century, and the *Babylonian Talmud*, about a century later, under the care of Rabbi Ashe. What was called the *Targums*—that is, Aramaic translations of portions of the Old Testament—belong partly to times earlier, partly to times later than this period.

When the Jews finally dispersed they adopted the languages of the various peoples among whom they happened to dwell; they continued, however, to write in classical Hebrew, as well as in the less pure form of the *Rabbinical* Hebrew; and Hebrew is the language of the synagogues to-day, except in the "reform" communities of America and Germany. Hebrew also serves as the medium of correspondence among Jews in different parts of the world. This language, however, is not the pure Hebrew of the Bible and synagogue. The most brilliant epoch of Medieval Jewish literature was during the time of the Moors in Spain. Of modern literature in the Hebrew language, there is little that is of general interest. See **Jews**.

HEBREWS. See **Jews**.

HEBREWS, THE EPISTLE TO THE, a book of the New Testament, concerning the authorship of which there is much doubt. Many claim it to be the work of Apollos, a Jew famed for his eloquence, but in the Scriptures it is attributed to Saint Paul.

The place and date of writing are not fixed. The letter is designed to help its readers, whoever they were, in avoiding the dangers which would lead them to forsake the faith in Christ. It shows oratorical power and sets forth Christ as the end and fulfilment of the law.

HEBRIDES, *heb're deez*, or **WESTERN ISLANDS**, a series of islands and islets off the western coast of Scotland. There are about four hundred islands in all, but only ninety are inhabited. The inhabitants are not Scotch, but a primitive people who speak Gaelic and live to themselves. They are divided among the counties of Ross, Inverness, Bute and Argyle. The islands are on the whole mountainous, and the climate is mild and humid. The soil is mostly poor, and agriculture, except in certain places, is very backward; oats, barley, potatoes and turnips are almost the only products. Cattle-raising and fishing are the chief industries. Population, about 100,000.

HE'BRON. About nineteen miles southwest of Jerusalem is one of the oldest inhabited towns in the world. Abraham lived there, and when his wife, Sarah, died he purchased the nearby cave of Machpelah from the Hittites for her sepulcher. There David was crowned king of Israel. This town was called Hebron; to-day it is known as El-Khalil. It has at present a population of 20,000, most of them Mussulmans. From 1187 to 1918 it was under Mohammedan rule. Within the city is a great mosque, built over a cave, supposed to be the ancient sepulcher, in which not only Sarah, but Abraham, Isaac, Jacob and Rebecca were buried.

HECATE, *hek'a tee*, in Greek mythology, a goddess frequently represented as having three heads or three bodies and with serpents around her neck and shoulders. She had power to bestow or withhold wealth, victory, wisdom, good luck and prosperity. She was latterly confounded with other divinities, such as Ceres, Diana and Proserpina, and finally she became, especially, an infernal goddess, who was invoked by magicians and witches. Dogs, honey and eggs were offered to her at places where three roads met.

HEC'LA, or **HEKLA**, a volcano of Iceland, about twenty miles from the southwest coast. It is about 5,000 feet in height and has several craters. The mountain is composed chiefly of basalt and lava and is always covered with snow. One of the most tremen-

dous eruptions occurred in 1783, after which the volcano remained quiet till September, 1845, when it again became active and continued, with little intermission, till November, 1846, to discharge ashes, masses of pumice stone and a torrent of lava. The last outbreak was in March, 1878.

HECTOGRAPH, *hek'to graf*. See **COPYING DEVICES**.

HEC'TOR, in Greek mythology, the son of Priam and Hecuba, the bravest of the Trojans, whose exploits are celebrated in the *Iliad*. Having slain Patroclus, the friend of Achilles, he was in turn killed by Achilles, and his body was dragged at the chariot wheels of the conqueror about the walls of Troy. Priam afterward gained possession of it and gave it solemn burial. Hector is the most attractive warrior in the *Iliad*, and one of the finest episodes described therein is his parting from his wife, Andromache, before his last combat.

HEC'UBA, of Phrygia, in Greek legend, the second wife of Priam, king of Troy, to whom she bore Hector, Paris, Cassandra, Troilus and other children. After the fall of Troy she was given as a slave to Odysseus, and, according to one form of the legend, in despair she leaped into the Hellespont.

HEDGEHOG, *hej'hog*, a small animal found in Europe and the western part of Asia, whose most noticeable peculiarity is



HEDGEHOG

the presence of sharp quills on its back. These are extensions of the animal's stiff hair. Short fur covers the underside of its body. It is about nine inches long, and has a long nose and short ears. It feeds on fruits, twigs, birds, small reptiles and insects, using its long nose to root the latter out of the ground. By means of a special muscle the hedgehog can roll itself into a ball and straighten out its stiff quills, and in this

form can defy almost any enemy which attacks it. Four to eight young are born at a time, and the baby hedgehogs are soon covered with prickles. The American porcupine (which see) looks like the hedgehog, but differs from it in habits. Both animals belong to the order of rodents.

HEDIN, *heh deen'*, SVEN ANDERS (1865-), a Swedish explorer, celebrated for his expeditions and researches in parts of Asia. His first explorations were in Eastern Turkistan, Northern Tibet, the Pamir, Mongolia and Siberia. *Through Asia*, published in 1899, contained the results of his observations. His chief contributions to geographical science have been data collected on a journey through Tibet from 1906 to 1908. From the material supplied it was possible to make the first detailed map of that part of the Asiatic continent. Among the numerous honors Hedin received were election to the Paris Academy of Sciences and enrollment in the Swedish nobility. He was a voluminous and entertaining writer, and his books have been given wide circulation. Among the latest are *Southern Tibet*, in twelve volumes (1922); *My Life as an Explorer* (1925); *Across the Gobi Desert* (1931); *Jehol, City of Emperors* (1931); and *The Conquest of Tibet* (1934).

HEDJAZ, a district in Western Arabia, part of the Kingdom of Saudi Arabia, lying along the eastern shore of the Red Sea. See ARABIA.

HEGEL, *ha'gul*, GEORG WILHELM FRIEDRICH (1770-1831), a German philosopher who has profoundly influenced modern theological and philosophical thought. He was born at Stuttgart and was educated at the University of Tübingen. Through Schelling's influence Hegel became a lecturer at the University of Jena. He afterwards was made director of the Nuremberg gymnasium, and later occupied successively the chairs of philosophy at Heidelberg and Berlin.

Hegel's attempt as a philosopher was to define the relation between the finite self and the universal self, or God. He found that the personal self is a conscious self only as it recognizes its relations to others, that is as it becomes a social self. The more we project ourselves into the lives of others the more fully do we realize our deepest self, that is, the one universal self, God. He held that happiness and virtue are known only in the conquest of their opposites, sorrow and vice.

Hegel was appointed school councilor by the Bavarian government, and was also made a member of the commission of education by the Prussian government. His chief contribution to education was the indirect influence of his philosophy, which changed educational thought and systems. He attributed great importance to the family and state as factors of education, and he placed great stress upon authority in the instruction of children. He believed that the reasoning powers should not be developed too early, but that they should receive attention as soon as the child had acquired a good fund of knowledge through the senses. He also believed in the value of the classics as a source of culture. His most important works are *Logic*, *The History of Philosophy*, *Esthetics* and *Philosophy of Religion*.

HEGIRA, *hej'erah*, or *he j'ira*, the term commonly used to indicate Mohammed's flight from Mecca, July 16, 622 (see MOHAMMED). The Caliph Omar instituted, in 639 or 640, a new Moslem calendar, to begin with the first day of the first month in which the flight took place. The Mohammedan year, as a lunar year, is shorter than ours by about eleven days. A rough and ready method for finding the year in our calendar corresponding to a given year in the Mohammedan is to subtract from the latter $\frac{1}{3}$ of itself and add 622 to the remainder. As, 1324 of the Mohammedan calendar corresponds to 1906 ($1324 - 40 + 622 = 1906$). To find the precise year and day, multiply the year of the Hegira by 970,224, strike off from the product six decimal figures and then add 621.5774; this will give the year of the Christian Era; the day of the year is obtained by multiplying the decimal figures by 365.

HEIDELBERG, *hi'del berK*, GERMANY, a city of Northern Baden, situated on the left bank of the Neckar River, in one of the loveliest districts of the country, about twelve miles southeast of Mannheim and fifty miles south of Frankfort. It stands on a narrow strip between the river and the castle rock, and it consists chiefly of one main street. The castle, begun in the end of the thirteenth century and exhibiting elaborate examples of early and late Renaissance architecture, is the most remarkable edifice in Heidelberg and one of the most famous structures in Europe. It is now an ivy-clad ruin, but it is carefully preserved from further decay; it stands high above the town in the midst of a beautiful

park. One of the greatest curiosities of the place is the Heidelberg Tun (liquor cask), kept in a cellar under the castle. It is thirty-six feet in length, and twenty-six feet in diameter, and is capable of holding 800 hogsheads. Heidelberg is also famous for its great university, the oldest in Germany (see below). The principal industry of the town is brewing. Population, 1933, 84,640.

Heidelberg University, founded in 1386, is one of the most famous universities in the world. It maintains faculties of theology, law, medicine and philosophy, and has about 100 professors and lecturers in normal times. At the outbreak of the World War its student enrollment was about 1,500. The institution is noted for the jovial spirit of its college life.

HEILPRIN, *hile'prin*, ANGELO, (1853-1907), an American scientist and traveler, was born in Hungary. He came to the United States when three years of age, but returned to Europe to complete his education, studying in London, Geneva and Vienna, and making a specialty of natural history. On his return to the United States he was appointed professor of paleontology and geology at the Philadelphia Academy of Natural Sciences and occupied the position for sixteen years. During his connection with the Academy, Professor Heilprin made numerous journeys to Florida, Bermuda Islands and Mexico, and thoroughly investigated the geology of each of these regions. He led the Peary relief expedition in 1892, and in 1902 ascended to the crater of Mount Pelée while the volcano was in a state of eruption. Among his best-known works are *The Geographical and Geological Distribution of Animals*, *Principles of Geology*, *The Earth and Its Story* and *Alaska and the Klondike*. He was chief editor of a revised edition of Lippincott's *Geographical Gazetteer*.

HEIMDALL, *hime'dal*, in Scandinavian mythology, the son of Odin, who kept watch on the rainbow bridge over which the gods passed from Asgard, their home to the earth. His sight and hearing were more acute than those of mortals, and nothing could evade his vigilance.

HEINE, *hi'ne*, HEINRICH (1797-1856), generally accepted as the greatest name in German literature since Goethe. The delicacy and melody of Heine's lyrics, the railery, the graceful wit of his satires has not been approached by any of his compatriots.

Heine was born of Jewish parents at Düsseldorf. He studied law at Bonn, Berlin and Göttingen, took his degree and sordidly renounced his faith in order to obtain a license to practice. His revolutionary tendencies and his open admiration for Napoleon made him exceedingly unpopular in Germany, and by 1830 it had become practically impossible for him to live there. He removed, therefore, to Paris, where he was well received and where he lived until his death.

Most of Heine's writings were lyrical, but they include a large amount of journalistic, biographical and controversial material. Some of the exquisite lyrics in his *Book of Songs* were set to music by Schumann and Mendelssohn. The result of a vacation trip in the Harz Mountains was his *Harz Journey*. This was the first of a series of *Travel Pictures*, which were partly biographical, containing spirited and piquant discussions of religious and political subjects and satirical comments. During his last years, though disabled with paralysis, he continued to produce his wonderful melodious songs, satires and humorous bits.

HEIR, *air*, in law, one to whom the property of a deceased person passes. In America it denotes those to whom the *real* property descends, not by will, but only when the will is lacking (see WILL). In other countries, however, the term is used more broadly, to include all who have rights to property of a deceased person, either through will or by the natural laws of descent. See REAL PROPERTY; PERSONAL PROPERTY.

HEIR APPARENT, an heir to an estate or to a throne whose right to succession is undisputed if he survives the present holder. This is the title of the prospective heir to the throne in monarchies. In Great Britain the heir apparent is usually the Prince of Wales, eldest son of the king. Under Edward VIII, his younger brother is heir apparent but he is not Prince of Wales.

An *heir presumptive* is an heir in line of succession, but between him and the throne there are others who will first inherit unless death intervenes. See WALES, PRINCE OF.

HEL, *hale*, in Norse mythology, the daughter of Loki, the goddess of the dead, who dwelt beneath one of the three roots of the ash Yggdrasil. Dark rivers surrounded her abode, and a dog watched without. She herself, in the guise of a woman of half black and half fair complexion, was supposed to

ride about on a three-footed horse. She was often to be propitiated by an offering of oats. Within her kingdom dwelt only those who died of disease or old age.

HELEN, in classical legend, the most beautiful woman of her age, the daughter of Jupiter and Leda and the sister of Castor and Pollux. By the advice of Ulysses, her numerous suitors had bound themselves by oath to respect her choice of a husband and to avenge any injury done to her or to her husband through her. When, therefore, after her marriage with Menelaus, she was carried off by treacherous Paris, her former suitors fulfilled their vow and set forth against Troy, the city of Paris. On the death of Paris, Helen was married to his brother, Deiphobus, but after the end of the struggle she was again received by Menelaus and they returned to Sparta, where they ruled in peace until the death of Menelaus. According to most legends Helen was afterwards murdered at Rhodes. For details of the war which followed Helen's abduction, see the article **MYTHOLOGY**.

HEL'ENA, **ARK.**, founded in 1820, is the county seat of Phillips County, 110 miles east of Little Rock, on the Mississippi River and on the Missouri Pacific, the Illinois Central, and the Missouri & North Arkansas railroads. There is steamboat service to various river towns, and an airport is in West Helena. The city has an extensive trade, and contains lumber and cottonseed oil mills, foundries, railroad shops, box factories and refineries. There is a public library, a county museum, and a Federal building. Population, 1920, 9,112; in 1930, 8,316.

HEL'ENA, **MONT.**, the capital of the state and the county seat of Lewis and Clarke County, seventy-two miles northeast of Butte, on the Great Northern and the Northern Pacific railroads. The Intermountain Union College, Carroll College, and Saint Vincent's Academy are located in Helena, and the city has public, state and college libraries. There are extensive copper, silver and iron mines in the vicinity, and the city contains machine shop, mining machinery works, smelters and flour and lumber mills. The city has a cathedral and numerous other splendid buildings. The place was settled as a mining camp in 1864. The first panful of gravel washed out \$20 in coarse gold, and during the next six years \$15,000,000 were taken out of the camp. Helena has been the capital of the

state since 1869. The mayor and council plan of government is in force. Population, 1930, 11,803.

HELGOLAND, *hel'go lahnt*, or **HELIGOLAND**, an island belonging to Germany, in the North Sea, about forty miles from the mouth of the Elbe. It is less than two miles long and one-half mile broad, and the highest point is 200 feet. Its rocks, of reddish sandstone, present a perpendicular face to the sea. Until 1914 there were 2,500 people on the island, but at the beginning of the World War they were removed and given homes on the German mainland. Thereupon Helgoland was made an impregnable fortress and a strong naval base. It was one of Germany's important defenses during the war. One condition of the treaty of peace imposed on defeated Germany was that Helgoland's fortifications should be dismantled. This order was obeyed, but in 1936 its fortification was begun again.

Until 1890 Great Britain owned the island. In that year it was traded to Germany for Zanzibar, on the East African coast.

HELIANTHUS. See **SUNFLOWER**.

HEL'ICON, a mountain range in Boeotia, Greece, celebrated among the ancients as the seat of the Muses. The highest summit is Mount Helicon (5,000 feet). On the eastern slope a temple adorned with statues stood in a grove sacred to the muses. The poet Hesiod lived at the foot of the mountain.

HELIOGRAPH, *he'le-o graf*, or **HE'LIOSTAT**, a name given to various contrivances for reflecting the sun's light, either temporarily or continuously, to an observer at a distance. The simplest heliograph is a mirror hung up at a distant station so as to reflect a flash to the observer whose station may be many miles from it. This mirror is generally so adjusted that the flash occurs exactly at some prearranged hour, and by being in readiness the observer can get an observation with precision in regard to time. Under good atmospheric conditions messages have been flashed more than 200 miles. By being fitted with an adjustment of clockwork, the mirror can be made to revolve with the sun and to reflect a beam of sunlight steadily in one direction. An instrument with this attachment is often called a *heliotope*. The heliograph has been used for signaling in war, and it is employed by the United States Coast and Geodetic Survey in measuring distances by triangulation.

